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IICA — CIDA

Review of the Agricultural Sector in Guyana:

VOLUME 2

TECHNICAL PRESENTATIONS

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Ministry of Agriculture

Inter-American Institute for Cooperation on Agriculture (IICA)

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FOREWORD

The Government of Guyana has taken the decision to give greater attention to the agriculture sector, with the dual purpose of ensuring an adequate food supply for all Guyanese and of increasing the quantities of food exports as a means of earning much needed foreign exchange.

In order to increase the production of quality food supplies at realistic prices, a great deal of planning is required. Of course, good planning requires accurate information on the agricultural sector, from which priority problems can be identified and effective actions and projects designed.

One of the basic constraints to determining sector policy and formulating development projects has been the scarcity of reliable information on the agriculture sector. In an attempt to overcome this situation the Ministry of Agriculture (MOA) and the Inter-American Institute for Cooperation on Agriculture (IICA) initiated a joint effort in March of 1993. The first activity focused on the collection and organization of available information on the agriculture sector. The documents presented in Volume 2 of these proceedings represent the principal results of that effort. The second activity was the Workshop for the "Review of the Agricultural Sector in Guyana." This was successfully executed on 23-24 August, 1993. During this Workshop some 80 persons (see Annex in Volume 1), representing the diverse sub-sectors, had the opportunity to review the thirteen papers and present their opinions in ten separate Workgroup Sessions. The results of those discussions are presented in Volume 1 of these Proceedings.

It is recognized that the road from problem identification to problem solution is a long and difficult one. It is hoped that the information and ideas presented in Volumes 1 and 2 will lead to clearly defined policies and projects which effectively impact upon rural populations.

Prabhu Sookraj
Permanent Secretary
Ministry of Agriculture

Jerry La Gra
Representative in Guyana
Inter-American Institute for
Cooperation on Agriculture

ACKNOWLEDGEMENTS

Any event of this nature requires the participation and support of a large number of organizations to make it successful. In this case the support came from national, regional and international organizations.

The Ministry of Agriculture (MOA) was a joint sponsor of the Workshop and technical support was provided by its Departments of Planning, Crops and Livestock and Fisheries. The Inter-American Institute for Cooperation on Agriculture (IICA) provided financial assistance and coordinated the event. The MOA and IICA both provided secretarial services which were greatly appreciated.

Other institutions providing technical support in the preparation of papers included the National Agriculture Research Institute (NARI), the New Guyana Marketing Corporation (GMC) and the local office of the Regional based Caribbean Agriculture Research Development Institute (CARDI).

Special thanks is due to the staff of the Forte Crest Hotel who provided high quality services and a pleasant environment for the Workshop.

Finally, and most importantly, thanks to the more than 80 participants (see Annex, Volume 1) from the public and private sectors who took the time from their busy schedules to attend the Workshop for two days and remain in their respective discussion group late into the evening.

LIST OF ACRONYMS

AGRIS Agricultural	International Information System in the Sciences
AGRINTER for	Inter-American Agricultural Information System Latin America and the Caribbean
BEV	BEV Enterprises
CAGRIS System	Caribbean Agricultural Research Information
CAMIS	Caribbean Marketing Intelligence Service
CARAPHIN	Caribbean Animal and Plant Health Information Network
CARDI Development	Caribbean Agricultural Research and Institute
CARPIN	Caribbean Patent Information Network
CARSTIN	Caribbean Science and Technology Information Network
CARTIS	Caribbean Trade Information System
CAS	Current Awareness Service
CATIS Service	Caribbean Agricultural Technical Information
CBN	Caribbean Biotechnology Network
CDB	Caribbean Development Bank
CEIS	Caribbean Energy Information System
CESO	Canadian Executive Service Overseas
CFRAMP	CARICOM Fishery Resource Assessment and Management Programme
CHPA	Central Housing and Planning Authority
CIDA	Canadian International Development Agency
CIDIA	Inter-American Centre for Agricultural Documentation, Information and Communication
CNIRD	Caribbean Network for Rural Development
COPESCAL	Commission for Inland Fisheries of Latin American and the Caribbean
CRIN	Caribbean Rice Improvement Network
CTA	Technical Centre for Agricultural and Rural Cooperation
DANIDA	Danish International Development Agency
DOF	Department of Fisheries
EEC	European Economic Community
EEZ	Exclusive Economic Zone

EI\WDFCSL	Essequibo Islands\West Demerara Fishermen's Cooperative Society Limited
EPFCSL	Essequibo\Pomeroon Fisheries Cooperative Society Limited
FAO	Food and Agriculture Organization
FMP	Fisheries Management Plan
FTAP	Fisheries Technical Assistance Project
FZ	Fishery Zone
GAHEF	Guyana Agency for Health Sciences Education and Food Policy
GAIBANK	Guyana Agricultural and Industrial Development Bank
GBT!	Guyana Bank for Trade and Industry
GDP	Gross Domestic Product
GFL	Guyana Fisheries Limited
GGFCSL	Greater Georgetown Fishermen's Cooperative Society Limited
GLA	Guyana Library Association
GMC	Guyana Marketing Corporation
GNBS	Guyana National Bureau of Standards
GNCB	Guyana National Cooperative Bank
GNRA	Guyana Natural Resources Agency
GNEC	Guyana National Engineering Corporation
GOG	Government of Guyana
GREB	Guyana Rice Export Board
GRMEDA	Guyana Rice Millers and Exporters Development Association
GRMMA	Guyana Rice Milling and Marketing Authority
GSA	Guyana School of Agriculture
GS&TC	Georgetown Seafoods and Trading Co. Ltd.
GUYMIDA	Guyana Manufacture and Industrial Development Association
GUYSUCO	Guyana Sugar Corporation
IAEA	International Atomic Energy Agency
IAST	Institute of Applied Science and Technology
IDB	Inter-American Development Bank
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IICA	Inter-American Institute for Cooperation on Agriculture

INFOTERRA	Information System on the environment
IPED	Institute for Private Enterprise Development
LAC	Latin America and Caribbean
LIDCO	Livestock Development Company
MMA/ADA	Mahaica/Mahaicony/Abary Agricultural Development Authority
MOA	Ministry of Agriculture
MPFL	Marine Food Products Ltd.
MPLIS	Multi-purpose Land Information System
NAIN	National Agricultural Information Network
NARI	National Agricultural Research Institute
NBIC	National Bank of Industry and Commerce
NDDP	National Dairy Development Programme
NEDECO	Netherlands Engineering Consultants
NEOCOL	National Edible Oil Company Ltd
NFP	National Focal Point
NHS	Noble Home Seafoods
NPRGC	National Paddy and Rice Grading Centre
NSRC	National Science Research Council
RDC	Regional Democratic Councils
REDBIO	Technical Cooperation Network on Caribbean Biotechnology
Plant	
RFCSL	Rosignol Fishermen's Cooperative Society Limited
RPA	Rice Producers Association
RTE	Research Training Extension
SAPIL	Seals and Packaging Industries Ltd
SDI	Selective Dissemination of Information
SIMAP	Social Impact Amelioration Programme
TED	Turtle Excluder Device
TEPL	Tropical Food Products Limited
UCFCSL	Upper Corentyne Fishermen's Cooperative Society Limited
UNESCO	United Nations Educational, Scientific and Cultural
UG	Organization University of Guyana
USAID	United States Agency for International Development
UWI	University of Gauyana
WECAFC	Western and Central Atlantic Fisheries Commission

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WELCOME AND OPENING REMARKS

**BY MR. PRABHU SOOKRAJ, PERMANENT SECRETARY,
MINISTRY OF AGRICULTURE**

It is with a great deal of pleasure that I welcome you to this seminar. As you would have been told, the main purpose is to provide a forum for the many agriculture-related organizations in the public and private sectors to give their views on the way forward for the sector.

Agricultural development has been and will continue to be a major focus of government's efforts. This sector has continued to be the backbone of the economy and will continue to provide the impetus for our economic recovery for many years to come.

Since becoming Permanent Secretary of the Ministry of Agriculture late last year, I have been concerned with three major things. These are:

- 1) the formulation and management of projects
- 2) the capacity of institutions which support the sector; and
- 3) the formulation of policies for the sector

With regard to projects, I have been concerned with the degree to which they have been meeting their objectives; the degree to which greater efficiencies can be effected, and the extent to which the projects are responding to the priority needs of the sector. It is no secret that some projects, on which significant sums have been spent, have not met their objectives. To a large extent, this has been due to the weak capacity of government to formulate and monitor these projects. In this connection, the Ministry now has an Agricultural Project Cycle Unit which will be responsible for keeping track of all projects currently being implemented. The idea is that all problems encountered in implementation should be speedily resolved. In addition, the unit would assist in formulating new projects through discussions with funding agencies and facilitating preparatory work.

Secondly, the public sector institutions which serve the agricultural sector - of which the Ministry of Agriculture is the main actor - all suffer from severe constraints in funding and technical capability. In addition, over the years, there has been a great deal of overlapping of functions and some loss of direction by some of these bodies. In a situation of such severe funding constraints, we cannot afford such duplication of effort. More importantly, unless the various organs of government are clear as to their functions, confusing signals will be given to farmers and productivity will suffer.

Some of the areas in which urgent institutional reform is needed are:

- management of the drainage & irrigation system;
- sea defences;
- the research, extension and training system;
- the land management system;
- the system for financing agricultural activities; and
- the marketing infrastructure and information system.

The third area has to do with government's agricultural policy framework. Although there has been fairly radical policy reform at the macroeconomic level, agricultural policy has lagged behind and has been somewhat passive in its reaction to these wide-ranging changes. It is recognized that the recent changes in macroeconomic policy have, generally, been to the benefit of the sector. Producers are now able to receive the full value for their output and have been freed of the restrictions which had been imposed on them for a number of years. But, these very policy changes have helped to expose the underlying weaknesses in the country's infrastructure and marketing systems.

With the transfer of many production-related activities to the private sector, government's interventions will have to be much more focused on the improvement in the legal-institutional framework which will facilitate greater investment and productivity in the sector. To respond to these challenges, we must enhance our ability to monitor developments in the sector, encourage dialogue with all concerned; properly analyze the results; and arrive at correct formulations for policy and programming.

The Ministry will, before the end of this year, be producing a programme document which will set out our view of preferred directions for the medium term and priority programme areas for our attention.

It is for the above reasons that this seminar assumes such importance. This is an inter-institutional effort which combines the skills of the public and private sectors and is aimed at:

- compiling decision-making information on the important issues facing the sector;
- identifying solutions; and
- identifying priority projects.

As such, the Ministry of Agriculture places great store on the advice which it receives from IICA, other technical assistance bodies and funding agencies in the further development of government's plans and policies.

As a result of this event, government will have at its disposal information and recommendations on all the areas covered. This will greatly assist in the on-going process of formulating new plans and programmes for the development of agriculture in Guyana.

THE NEED FOR SYSTEMATIC RURAL DEVELOPMENT

BY MR. JERRY LA GRA, IICA REPRESENTATIVE

During the two decades of 1970 - 1990, the number of people living in poverty in Latin America and the Caribbean increased at an average annual rate of 4.1% (IDB, *Confronting Rural Poverty in LAC*). Poverty now affects over 200 million people in the Americas, nearly 50% of the total population. A recent study in Guyana of 743 rural households (IICA/IFAD) showed that only 35% lived above the poverty line [G\$60,000 (US\$480) per capita]. Another 35% lived in moderate poverty and 30% lived under conditions of critical poverty. Under the above conditions, the rural poor face three fundamental problems:

- inadequate employment opportunities in farm and non-farm activities;
- inadequate nutrition, poor health, lack of education and other basic services;
- inadequate levels of organization caused by poor management skills and limited opportunities for training and other types of assistance.

Given this distressing situation, something is obviously wrong in the development process. Large investments in time and money are not having the desired impact.

Most institutions seem to agree that a very high percentage of their projects do not achieve their desired goals. This is a nice way of saying that too many of their projects fail. Research carried out by diverse development institutions have identified a number of reasons for project failures. Common among them are causes such as: poor participation of beneficiaries and implementors in the design stage; lack of concern with the sustainability of the projects; inadequate attention given to market opportunities; partial analysis of complicated systems; failure to involve all the key participants; omission of policy issues; short-term nature of projects; failure to monitor and evaluate, among others.

To avoid repetition of mistakes and more failed projects, the public and private sectors and support organizations must work towards common goals in a well coordinated joint effort. This Workshop is one contribution towards integration. It has helped to not only collect a large amount of information and organize it into one document, but it has brought together a large number of sector specialists to analyze the information, reach conclusions and make recommendations as to possible solutions. While the Proceedings from this Workshop will become a valuable reference document, it is anticipated that it will soon be followed by an Agricultural Sector Policy Document and a number of rural sector development projects, which will not only be sustainable but will have a significant impact on reducing the level of poverty in Guyana.

IICA is very pleased to have had the opportunity to help organize this Workshop and looks forward to give continued support to the development of the agricultural sector of Guyana.

OPENING ADDRESS

**BY HON. REEPU DAMAN PERSAUD,
MINISTER OF AGRICULTURE**

I would like to welcome all the representatives from the Ministry of Agriculture, other entities within the public sector involved with agriculture, representatives from the private sector and producer organisations and representatives from the international donor agencies.

In the spirit of the present government's commitment to open government, we are pleased to have present at the Workshop such a broad cross section of representatives from the agricultural sector in Guyana.

The purpose of this Workshop is to hear and discuss various papers on the Agricultural Sector. This will assist the ongoing process in the Ministry of analysing the current situation in agriculture and developing an agricultural programme and policies appropriate to the country's needs.

Government understands that the diversity of the sector and the complexity of the issues makes extensive consultation essential in the development of successful agricultural policies.

I wish to call to your attention the recent positive indicators of growth in the sector, particularly in sugar and rice.

It was recorded at the Annual General Meeting of Guysuco on the 18th August, that the company recorded in 1992 its highest profit since the nationalisation of the sugar industry.

In the rice sector, production reached 105,000 tons of rice for the first crop of this year, 1993, compared to only 81,000 for the same period in 1992. Similarly, exports of rice have increased, from 46,000 tons for the first half of 1992, valued at US\$14 million, to 60,000 tons this year, with a value of nearly US\$17 million.

The Agricultural Sector continues to enjoy the support of international donor agencies. Of particular note is the assistance being provided by several institutions - the EEC, the IDB, the World Bank, PL480 and the CDB - in the rehabilitation of the Sea Defences, which play such a vital role in guaranteeing the livelihood of thousands of Guyanese farmers. Together these agencies will finance the rebuilding of 40km of sea defences.

There are many other important projects. The FAO and the UNDP are assisting the National Seed Programme; CIDA is providing assistance to the fishing industry; the IDB is assisting the reactivation of the rice and sugar industries as well as supporting initiatives in drainage and irrigation. Drainage and irrigation rehabilitation is also supported by the EEC and PL480 funds. IFAD continues to support the Integrated Rural Development programme in Region 3 and CARDI continues to carry out important research work on livestock and in the intermediate savannahs. IICA is assisting my Ministry in crop and livestock development and most recently in the area of planning.

Despite positive indicators, the government is fully aware of underlying institutional and infrastructural weaknesses which question the sustainability of recent positive trends. Government has inherited these problems, which are the direct result of many years of economic stagnation and decline, leading to underinvestment in agriculture by both the public and private sectors.

The recent problems encountered in supplying the Jamaican market highlights the challenge facing the government: the productivity and quality of much Guyanese produced rice is too low to allow profitable exports. This in turn highlights the need for major initiatives to be undertaken to improve vital services such as extension, drainage and irrigation and seed distribution, which will ensure higher quality and productivity in the future.

Looking more broadly across the sector, initiatives need to be taken to improve the flow of financing to rural producers. Marketing infrastructure needs improvement in many areas and a major initiative is also required in the area of land titling.

As a government committed to promoting agricultural development, we are determined to face these challenges head on and work hard to develop the right policies to deal efficiently with them. Government will also do all it can to seek further assistance from the international donors to implement new programmes and projects.

The process of developing effective policies is dependent on generating accurate information and allowing a variety of views and perspectives to be considered. That is why this Workshop is so important as it is bringing together a great deal of experience and expertise. We hope that it will produce some very concrete results in terms of policy and project ideas which will guide the development of the agricultural sector.

I would like to thank the Planning Department for working so hard with IICA to organise this event. I would also like to thank IICA's staff and consultants for their very important contribution to the Workshop as can be seen in the numerous documents. Finally, I would like to thank the presenters of the various papers and all those who have come to participate today. I hereby declare this Workshop open and look forward to reviewing the results of your deliberations.

PART 2

TECHNICAL PRESENTATIONS



INSTITUTIONAL ORGANIZATION FOR IMPLEMENTATION OF AGRICULTURAL PROGRAMMES & POLICIES

By: Nigel Durrant, Agriculture Economist

1. OBJECTIVES OF PAPER

The Objective of this Paper is to provide an overview of the sector and to focus attention on the range of organizations which provide support for the agricultural sector; the types and functions of these organizations; with attention being paid to project development and implementation issues as well as to general issues of budgeting and funding.

1.1 Macro-economic Overview

Government's economic policies, during the period starting from the early 1970's to the mid 1980's, emphasized state intervention with key sectors of the economy being nationalized (eg. sugar and bauxite). Trade in inputs and final goods was brought increasingly under government control.

The macro-economic environment, as a whole, had negative effects on agriculture.

Exchange rate management policies probably had the most serious effects on the economy since the dual exchange rate system imposed an implicit tax on the export sectors ranging, by one estimate, from 53% to 76%.

The direction of the economy since 1988 has, in large measure, been determined by the structural adjustment measures implemented by Government. The so-called Economic Recovery Programme aimed at eliminating distortions on the commodity and factor markets and reducing the size of the public sector, has included, *inter alia*,

- elimination of price controls;
- establishment of a floating exchange rate for the Guyanese dollar;
- reduction or elimination of import licensing and import tariffs;
- privatization of public assets;
- introduction of private sector management into the sugar industry;
- reduction in the size of the public service budget and an increased reliance on revenue to finance the budget; and
- major rescheduling of bilateral debts and elimination of arrears to international agencies.

The above measures have set the stage for the resurgence of private initiatives throughout the economy although the effects of adjustment have been particularly hard on low and fixed income groups. In 1991 and 1992, Gross Domestic Product (GDP), at factor cost (constant 1988 prices), grew by an estimated 6% and 8% respectively while the agricultural sector grew at 16% and 28% in each year. The place of the agricultural sector in total output also grew, from 27% in 1991 to 32% in 1992.

1.2 Overview of the Agricultural Sector

Agricultural activity in Guyana is concentrated on a narrow coastal strip representing less than 10% of the country's total surface but containing 90% of the population. This area remains the main focus of agricultural development activity.

Agriculture contributes more than 30% to GDP, employs about 35% of the labour force and provides indirect employment to about 50% of the population. Most of the country's exports are agricultural and major crops alone (sugar & rice) account for around 50% of total exports. Both sugar and rice continue to depend on preferential export markets in Europe and, in the case of sugar, also in the USA.

Given the current moves towards multilateral free trade, the future of preferential arrangements is in question. It is therefore necessary to become more competitive by reducing costs of production and increasing productivity; maintain a favourable macroeconomic environment and encourage private investment.

The prospects for the "other crops" sub-sector (which in 1992 accounted for 16% of agricultural GDP, are grown by small-holders and mainly serve the domestic market) depend to a large extent on the rehabilitation of infrastructure for water and transportation, the development of technology packages, the improvement of planting material and the greater infusion of capital into system.

1.3 Structure

Guyanese agriculture can be described as dualistic in structure. On the one hand, most of the sugar industry and much of the rice industry is operated on a fairly extensive, highly mechanized basis. On the other hand, most food crop production is undertaken on a small-scale basis on farms ranging from less than one acre to about 4 acres. There is a significantly skewed distribution of land holdings. The structure of land distribution and land use has much to do with the historical development of agriculture in Guyana.

Small-scale agriculture faces its own difficulties and, from the point of view of government policy, it is this sector which must attract a significant amount of attention.

1.4 Production Trends

The two major sectors, sugar and rice, both declined significantly during the last two decades. During 1977-1990, rice production declined by an average rate of -3.36%, and output in 1990 was 55% lower than in 1977. Sugar production was 47% lower in 1990, having declined by -5.21 annually. While there were increases in "other crop" production, (partly due to a transfer of resources from rice and sugar) these were not enough to compensate for the declines in the major sub-sectors.

2. DEVELOPMENTS IN THE SUPPORT SERVICES

2.1 Infrastructure

Perhaps the most pervasive feature of the agricultural sector over the last two decades has been the deterioration in physical infrastructure for drainage/irrigation, sea defences and transportation.

As government budgets began to decline, decreasing real amounts were spent on infrastructure. Just as important has been the deterioration in the systems for managing the infrastructure and for cost recovery.

Financing of rehabilitation and maintenance of infrastructure is a major problem for government. Imaginative schemes of cost recovery, where applicable, will have to be worked out.

2.2 Land

Land policy and administration are closely bound up with the management of infrastructure. Although a significant amount of the cultivable land area is under private ownership, most farmers in land development schemes operate under extremely short leases. The extent to which farmers are willing to invest their capital in on-farm infrastructure is largely determined by their perception of a permanent stake in the land. The large number of holdings without proper title also serves as a limitation on the ability of farmers to access formal credit. Previously announced policies of granting free hold title to holders of land of less than 15 acres were not implemented.

2.3 Finance

The non-availability of formal credit sources for the sector (in particular, small-holder agriculture) has continued to be a major limitation. The poor penetration of rural areas by commercial banks is symptomatic of the problem. Government's efforts at development banking have been stymied by poor management.

2.4 Technology Generation & Transfer

The technology generation and transfer system has been seriously affected by needless fragmentation and by attrition due to poor incentives. The creation of NARI in 1985 was a major step in the rehabilitation of the country's research capability. Extension, on the other hand, has become increasingly ineffective due, partly, to regionalization and the poor funding of the system. The recent recentralization of the system under the Ministry of Agriculture should improve the level of technical supervision but government will have to consider whether the continued separation of research and extension is appropriate.

2.5 Input supply, marketing & post-harvest operations

As the economy became more state controlled, so did the input supply sector. Input supply is now, generally, under private ownership. It is expected that input supply services will grow and diversify as entrepreneurs become more acquainted with the sector.

Government policy on marketing has taken several turns over the years. In the rice industry, the present open-market regime, while creating improved incentives to farmers, has also brought with it some degree of uncertainty which both farmers and traders must adjust to.

In respect of "other crops", the public markets - through which most fresh produce passes - are old, overcrowded and lacking in basic amenities. No serious effort has been made to rehabilitate and modernize these facilities.

Agro-processing, which could be an important stimulus to "other crop" production, has not made much headway in Guyana due, in large part, to the poor level of general utilities such as electricity and water supplies.

3. INSTITUTIONAL SUPPORT

The principal national, regional international and non-government organizations and institutions and their respective functions are identified in Table 1.

Table 1: Institutions Serving the Agricultural Sector

TYPE FUNCTIONS	PUBLIC SERVICE	WIDER PUBLIC SECTOR	INTER-NATIONAL / REGIONAL	NON-GOVT.
ADMIN/COORD/REGULATORY/POLICY	-Ministry of Agriculture (MOA) -Min. Trade		CARICOM	
TECHNICAL ASSISTANCE	MOA (Extension)		-Food & Agricultural Organization of the United Nations (FAO) -Inter-American Institute for Cooperation on Agriculture (IICA)	
FINANCE	Min. Finance	Guyana Agricultural & Industrial Bank (GAIBANK)	-Inter-American Development Bank (IDB) -World Bank -European Community (EC) -Caribbean Development Bank (CDB) -International Fund for Agricultural Development (IFAD) -United Nations Development Programme (UNDP) -Canadian International Development Agency (CIDA) -United States Agency for International Development (USAID)	Institute for Private Enterprise Development (IPEID)
TECHNOLOGY DEVELOPMENT & TRANSFER	MOA (Crops & Livestock Dept)	National Agricultural Research Institute (NARI)	-Caribbean Agricultural Research & Development Institute (CARDI) -Inter-American Institute for Cooperation on Agriculture (IICA)	

Table 1 Continued

TYPE FUNCTIONS	PUBLIC SERVICE	WIDER PUBLIC SECTOR	INTER-NATIONAL / REGIONAL	NON-GOVT.
TRAINING		-Guyana School of Agriculture (GSA) -University of Guyana (UG/ Faculty of Agriculture)	-University of the West Indies (UWI) -Regional Programme for Animal Health Assistants (REPAHA) (CARICOM)	
INFRASTRUCTURE	MOA (Hydraulics Dept.)			
AREA DEVELOPMENT	-Mahaica Mahaicony Abary Development Authority (MMA/ADA) -Min. Regional Development - Regional Administrations			
WELFARE		Social Impact Amelioration Programme (SIMAP)		FUTURES Fund
SUGAR		Guyana Sugar Corporation (GUYSUCO)		
RICE		-Guyana Rice Export Board (GREB) -National Paddy and Rice Grading Centre (NPRGC) -Guyana Rice Milling & Marketing Authority (GRMMA)		

Table 1 Continued

TYPE FUNCTIONS	PUBLIC SERVICE	WIDER PUBLIC SECTOR	INTER-NATIONAL / REGIONAL	NON-GOVT.
OTHER CROPS	MOA (Extension Service)			
NON-TRAD. EXPORTS		New Guyana Marketing Corporation (GMC)		
POULTRY	MOA (Crops & Livestock Dept)			
CATTLE	MOA (C&L Dept)	National Dairy Development Programme (NDDP)		
FISHERIES	MOA (Fisheries Dept)			

4. THE MINISTRY OF AGRICULTURE

The Ministry of Agriculture remains at the centre of the institutional make-up of the sector. As the primary governmental and general support institution, MOA is expected to:

- a) provide overall policy direction for the sector;
- b) ensure, on the one hand, the coordination of functions between a large number of public sector institutions involved in agriculture and, on the other hand, between those institutions and the private sector;
- c) respond to emergencies in the sector in areas such as sea defence breaches, sudden crop damage from pests/diseases or weather; marketing problems, etc.;
- d) monitor developments in the sector, provide current information and develop long-range plans.

The Ministry is organized into several administrative and technical units, as follows:

Political Directorate: Minister of Agriculture Minister within the Ministry
Top Management: Permanent Secretary Deputy Permanent Secretary
Support Units:
Administration
Finance
Personnel
Planning
Crops & Livestock
Hydraulics
Hydrometeorology
Lands & Surveys
Fisheries

As with other agencies of the public service, MOA has been subject to a serious decline in its real budget over the years. This has resulted in a decline in the overall skills level as well as a severe shortage of materials and equipment. Most departments are staffed at below-optimum levels, particularly in the technical grades, and have been forced to fill many posts with non-qualified personnel. Relief has been provided to some departments which administer internationally funded projects but the extent to which this has improved overall capabilities is limited.

The poor level of emoluments (which is a service-wide phenomenon) has resulted in a drift of more qualified personnel to international organizations, to the private sector and overseas. Until this matter is adequately addressed, severe limits will continue to be placed on the capabilities of the Ministry.

There is currently no overall development plan for the sector. The last attempt at such a plan was in 1987 when a draft Agricultural Development Plan, 1987-1990 was drawn up. This document was never officially ratified but has served mainly as a reference document. Given the significant policy changes which have taken place since then, the need for a current medium-term plan is very evident. Such a plan should do the following:

- a) provide an analysis of developments in the sector with explanations for trends in output and the state of the support services;
- b) clearly state government's overall approach to the development of the sector and for each sub-sector;
- c) provide a plan for the rehabilitation of the main institutions which support the sector;
- d) provide an estimate of the recurrent and capital needs of public sector institutions in important areas (e.g. infrastructure, technology development);
- e) set out priority public sector projects for implementation during the plan period;
- f) identify (where possible) sources of funding for priority programmes and projects; and
- g) set out those areas in which private initiative is to be encouraged along with the incentives (if any) to be provided by government.

The plan should have the full blessing of the Finance Ministry, the State Planning Secretariat and all other ministries and agencies (including international bodies) which impact on the disposal of funds to the sectoral ministries.

5. ORGANIZATION FOR PROJECT IMPLEMENTATION

Projects represent one of the most important vehicles for policy implementation.

An important concept in project analysis is that of the *project cycle*. This refers to the sequence of analytical phases through which a project passes [and are often] taken to be identification, preparation & analysis, appraisal, implementation, monitoring and evaluation.

Guyana, like most developing countries, depends to a large extent on externally funded projects and programmes. Within the public sector, the largest agriculture-related projects have been and continue to be in the area of physical infrastructure - drainage & irrigation (D&I) and sea defenses.

Table 2 sets out the major projects currently being implemented.

Table 2: On-going Projects by Purpose and Implementing Agency 1993

PROJECT PURPOSE	PUBLIC SERVICE	WIDER PUBLIC SECTOR	INTER-NATIONAL / REGIONAL	NON-GOVT.	PRODUCER ORGANIZATION
ADMIN / COORD / REGULATORY / POLICY	-Ministry of Agriculture IDB Agricultural Sector Hybrid Loan No. 876 (Sector policy adjustment) -Min. Trade		CARICOM		
TECHNICAL ASSISTANCE			FAO IICA		
FINANCE	Min. Finance	GAIBANK	IDB World Bank EEC CFC IFAD UNDP CIDA USAID	Institute for Private Enterprise Development (IPEDE)	
TECHNOLOGY DEVELOPMENT AND TRANSFER		-NARI - FAO/UNDP Assistance to NARI	CARDI		
TRAINING		-GSA -UG (Faculty of Agriculture)	-UMI -Regional Programme for Animal Health Assistants (REPANA) (CARICOM)		
INFRASTRUCTURE	MOA (Hydraulics Dept.) - Black Bush Polder Rehabilitation (IBD) (MUS\$9.6)				

Table 2 Continued

PROJECT PURPOSE	PUBLIC SERVICE	WIDER PUBLIC SECTOR	INTER-NATIONAL / REGIONAL	NON-GOVT.	PRODUCER ORGANIZATION
	- Small Scale Drainage & Irrigation (IDB) (mUS\$9.0)				
	- Infrastructure Rehabilitation (Sea Defence) (EEC) (mG\$850)				
	- West Coast Berbice Sea Defence (CDB) (mUS\$9.2)				
	- West Coast Berbice Agricultural Dev. (EEC) (mG\$43)				
	IDB Agricultural Sector Hybrid Loan No. 877 (sea defence, access roads & technical cooperation) (mUS\$22)				
AREA DEVELOPMENT	-MMA/ADA -Min. Regional Development -Regional Admins. (MOA) French / Guyana Integrated Rural Development Programme				
	- East Bank Essequibo Dev. (Region 3) (IFAD) (mUS\$9)				
WELFARE		SIMAP (various projects)		FUTURES Fund (various community projects)	
SUGAR		GUYSUCO			Cane Farmers Association

Table 2 Continued

PROJECT PURPOSE	PUBLIC SERVICE	WIDER PUBLIC SECTOR	INTER-NATIONAL / REGIONAL	NON-GOVT.	PRODUCER ORGANIZATION
	IDB Agricultural Rehabilitation Loan No. 839 (Importation of inputs) (mUS\$14.0)				
RICE		GREB NPRGC GRMA			RPA GRMEA (millers & exporters)
	IDB Agricultural Rehabilitation Loan No. 839 (Importation of inputs) (mUS\$14.2)				
OTHER CROPS					
NON-TRAD. EXPORTS		New GMC			ANTEG
POULTRY					Poultry producers assn.
CATTLE					
FISHERIES	MOA (Fisheries Dept.)				Various producer co-ops
	- Artisanal Fisheries Infrastructure Project (CIDA) (mG\$275.4)				
	- Fisheries Equipment facility (CIDA) (mCdn\$4.9)				
	- Fisheries Technical Assistance Project (CIDA)				
	- CARICOM Fisheries Resource Assessment & Management Programme (CIDA)				

6. ISSUES RELATING TO BUDGETS AND FUNDING

Due to the severe internal and external imbalances which have characterized the Guyanese economy since 1976, government has become increasingly dependent on external financing - through concessionary loans and grants. The capital budget is, in fact, based on the availability of such funding. Although there are draw-backs to such dependence, there is little alternative in the short to medium term.

On the recurrent side, the poor flow of local funds has implications for Government's ability to attract and retain adequate numbers and quality of staff, both at the technical and administrative levels.

The issue of cost recovery for services is one which must be addressed if any breakthrough is to be made in the budgetary impasse.

In general, government must improve its revenue collection capability by strengthening and streamlining its collection agencies such as the Customs administration and the department of inland revenue. Ultimately, however, increased revenues can only be derived from a buoyant economy. Agriculture, which along with mining remains the backbone of the economy, must therefore be guaranteed an appropriate policy environment as well as significant injections of public capital for the rehabilitation key infrastructure, the improvement of the technological base of the sector and for the enhancement of human resources.

RICE IN GUYANA: PRESENT SITUATION AND FUTURE POLICY

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1. INTRODUCTION

Rice has a dual function in the Guyanese economy: it is both the major source of income and employment for some 25 000 rural families and an important export commodity providing the nation with foreign exchange. In 1992 it contributed 3% to national GDP, representing 9% of agricultural GDP. Export earnings valued US\$35 million.

Since 1991 there has been a very marked increase in output after a decade of stagnation and decline. Projections for future production have been very optimistic. But during the first crop of this year (1993) major bottlenecks in the system have surfaced, the result of a long period of decline and underinvestment in the industry. These now threaten to reverse the recent positive trend in production.

The principle problem relates to marketing: Guyana produces rice neither cheaply enough nor of high enough quality to be able to compete on the world market and the country is increasingly facing stiffer competition in traditional protected markets. The reasons for this relate to problems at all levels of the industry. The result during the first crop of 1993 was that millers delayed payments to farmers as they tried to find export markets for rice that is too expensive for the world market and not of sufficient quality for the protected European market. Without payment for the first crop, many farmers will not be able to meet the expenses of planting a second crop and production may fall.

In this paper I will discuss the structure and present state of the Guyanese rice industry before examining the problems that are faced by the different participants within it. Policies and projects presently affecting the industry will then be considered before recommendations for future policy are made.

2. PART 1: AN OVERVIEW OF THE RICE INDUSTRY IN GUYANA

2.1 Recent Trends in Production and Exports

Any description of the Rice Industry in Guyana must begin by emphasising that it has three equally important and interdependent parts: field production, milling and marketing. Any tendency to overemphasise one part at the expense of the others will lead policy makers to develop a distorted policy which will ultimately fail. In Guyana, marketing, especially for export, is particularly important because of the limited capacity of the domestic market to absorb increased production. Table 1 gives the production data for 1981 to 1992.

Table 1: Production data for rice and paddy, 1981-1992

Year	Area harvested '000 acres	Paddy Output' 000 MT	Rice Output '000 MT	Paddy Yield bag/acre	Export volume 000 MT	Export Value:Mn	
						G\$	US\$
1981	220	272	163	19.4	78	109	39
1982	240	298	179	19.6	36	61	20
1983	187	246	148	20.7	42	65	22
1984	240	302	181	19.7	47	81	21
1985	192	256	154	21.0	29	56	13
1986	207	276	165	20.9	39	57	13
1987	185	243	146	20.7	69	157	16
1988	182	227	136	19.6	56	139	14
1989	169	237	142	22.1	41	367	14
1990	127	156	93	19.3	51	513	13
1991	186	251	151	21.3	54	2102	19
1992	219	291	175	22.3	115	4308	35

Sources: Planning Division. Ministry of Agriculture; GRMMA; exchange rate from World Bank Report. 1992

From Table 1 it can be seen that production stagnated and then declined in the 1980s. The price of paddy, which was set by the government until 1991, was declining in real terms during this period leading some paddy farmers to stop planting paddy and turn their lands over to pasture.

Government controls on exports up until the mid 1980s account for the strikingly low official export levels relative to rice production. Given a fairly stable domestic consumption of about 50 000 MT of rice per annum, it is reasonable to assume that the residual, after official exports are deducted from rice production, was exported unofficially.

Yields also stagnated in the 1980s, reflecting the lack of investment in improved water management and seed materials which characterised this period.

In February 1991 prices were liberalised and paddy prices jumped 300% in nominal terms. This produced the anticipated supply response as output recovered relative to 1990 (it should be remembered however that 1990 was a particularly disastrous year for paddy because of unseasonal weather). The positive trend has continued in 1992 and for the first crop of 1993. If the annual rate of growth from 1990-1992 of 35% is maintained in 1993, rice production will reach 210-220 000 MT rice in 1993.

With 95% of the first crop harvested at the end of June 1993, production had reached 105 000 MT. However, as mentioned above, marketing problems, which in turn relate to poor quality and inefficient production in the industry, may be threatening the sustainability of the recent increase in production. A more conservative estimate for total production this year is 200 000 MT.

2.2 The Field Production of Paddy

2.2.1 Paddy production by size of holding

Up to date information on the pattern of paddy production is not available as no farm household survey data is available after 1978.

According to the 1978 data, 56% of Guyana's approximately 24 500 farm households produced paddy on a total of 136 000 acres. However 87% of these households farmed less than 25 acres, and the median size of holding was between 10 and 15 acres. Nearly a thousand households farmed between 25 and 50 acres and 642 households had holdings of 50 acres or more.

The survey also found that a higher proportion of paddy farmers were low income producers than were farmers who concentrated on foodcrop and livestock farming (75% compared with 60%).

The survey noted that paddy production was generally not very efficient, poor water control being the major cause of underutilisation of paddy lands and low yields. Better managerial capability and better water control produced yields over 40% higher on some farms. Quality was also better.

It is likely that throughout the 1980s the basic patterns identified by the 1978 survey changed little as incentives to produce paddy fell with declining real prices and inputs for production became more and more difficult to obtain. Well before the worst years of the economic crisis in the mid and late 1980s, paddy farmers in the 1978 survey were reporting that they had problems in hiring machinery (25% with tractor services and 44% with combines), and obtaining fertilisers (30%) and other chemical inputs for production (20%). These problems were probably much more serious during the 1980s. Drainage and irrigation services also deteriorated further.

High costs and low returns in paddy production have probably been responsible for the emergence of a form of share cropping in many areas. Small farmers, unable to meet production costs themselves, rent out their land to bigger farmers in return for a bag or two of paddy each crop. Alternatively, they may take the rent in cash.

The absence of recent survey material means that it is difficult to establish how extensive this practice is. It is also possible that the higher prices paid for paddy since 1991 have encouraged farmers to take back control of land which they own or hold a lease for. Total area harvested has also increased as farmers have returned lands to paddy production and there has been a modest increase in yields. However the high cost of inputs probably remains a disincentive to many small producers.

2.2.2 Production technology

Paddy production technology is similar throughout the country, except on some very large holdings where aerial planting and spraying is used, and is completely mechanised. Farmers prepare land with tractors and harvest with combines. These services are often hired. Use of fertilisers and other agrochemicals is widespread. As Guyana itself produces none of these inputs, the resulting foreign exchange component of costs of production is very high and susceptible to movements in the exchange rate. Increased returns are therefore dependent on improved yields rather than lower area costs of production.

2.2.3 Seed

Several varieties of paddy seed are used in Guyana although one variety, Rustic, which was introduced into Guyana in the early 1970s, dominates with 74.2% coverage at a national level. Its average yield for the first crop in 1993 was 22.6 bags. After Rustic, no new varieties were introduced until 1991 when the National Agricultural Research Institute introduced Guyana 91. This produced an average yield for the first crop of 1993 of 27.8 bags. Coverage however was not high, only 1.5% of paddy sown.

2.2.4 Field costs of production

Despite a high import component, costs of paddy production are low by international standards. For a small farmer hiring machinery, per acre costs of production for the first crop 1993 were about GS20 000, equivalent to US\$400 per hectare. It appears that costs are similar for larger farmers. This is because the cost economies of larger operations tend to be offset by the higher cost of more sophisticated technologies. Irrigated rice production costs in other Latin American countries range from US\$600 - US\$800 per hectare. Costs in the United States are between US\$700 -US\$800.

2.2.5 Productivity

Low productivity almost completely offsets Guyana's cost advantage. The 1992 average yield was 3.5 MT/ha compared to a regional average of between 5 and 6 MT/ha. This gives a per tonne cost for Guyanese paddy of US\$114, compared to a regional average of about US\$136. One of the major causes of low yields are problems of poor drainage and irrigation. Poor quality seed is another serious problem.

The more modern production systems operated by the bigger producers in Guyana give much higher yields. For example, Kayman Sankar Company Ltd. achieved an average production level of 4.5 MT/ha for the first crop of 1993. This gives a per tonne paddy cost of US\$89. As mentioned above, costs of production are about US\$400 per hectare.

2.2.6 Returns to production

Taking the case of a small farmer first, for the first crop 1993, assuming costs of production to be G\$20 000 per acre (US\$400 per hectare) and an average yield per acre of 22.2 bags of C grade paddy (equivalent to 3.5 MT/ha), worth G\$950 each, net returns would only have been G\$1090 per acre. Thus net returns are equal to only 5% of total costs.

More efficient producers with higher productivity fare much better. Kayman Sankar Company Limited had an average yield of 29 bags per acre for the first crop of 1993. Rice quality was also higher. As the company mills its own paddy, it is not sold but it can be valued according to the prices agreed by the rice millers and Rice Producers' Association. Assuming the company produces an A grade paddy which fetches a price of G\$1150 per bag, net returns are G\$13,350. This is 67% of costs, which represents a very good return.

2.3 The Milling Sector

2.3.1 Number and size of mills

A recently completed survey undertaken by the Guyana Rice Millers and Exporters Development Association (GRMEDA), with support from the Ministry of Agriculture, established that there are 75 rice mills presently in operation with a total milling capacity of 161 tons per hour. Previous to the survey it had been thought that there were about 100 mills. The decline in numbers probably reflects the general decline of the rice subsector during the 1980s.

The majority of the mills are very small: fifty-two have a capacity of 1 ton or less. There are 15 mills with a capacity of between 2 and 5 tons and 4 mills with 10 or more tons.

Only the larger mills are able to produce rice of exportable quality. Quality standards are particularly high for the European market which allows only a small percentage of broken rice grains. The bigger mills use sorters to take out brokens and a couple have electronic colour sorters which can take out red and discoloured grains, improving rice quality.

The larger mills also have better storage and mechanised drying facilities which allow for more efficient use of milling capacity and ensure a higher quality product. Smaller mills have to rely on solar drying, a technology which is both unreliable, given the unpredictable climate in Guyana, and likely to reduce the final quality of the milled rice.

The quality of the rice milling equipment itself is reasonable. Many millers purchased new mills through the IDB's Industrial Reactivation Loan which made funds available to millers in the late 1980s. The aim was to increase the paddy/rice milling ratio from about 45-50% to 65%. About 50 Japanese Satake mills were purchased through this programme.

2.3.2 Grading

Millers are responsible for grading paddy when it is brought to the mills. Many of the smaller millers do not have the laboratory equipment which is recommended for carrying out grading by the National Paddy and Rice Grading Centre, preferring to rely on traditional methods. Table 2 gives the National Grading Standards for Paddy.

Table 2: National Standards for Grading Paddy

GRADE	VARIETAL PURITY %	DAMAGED %	DISCOLOURED GRAINS %	REDS %	CHALKY %	IMMATURE %
# 1 (Ex)	~	0.5	0.0	1.0	2	2.0
# 2 (A)	~	2.0	0.02	1.5		2.5
# 3 (B)	~	2.5	0.05	2.0	6	3.0
# 4 (C)	~	3.5	1.0	8.0	12	6.5

2.3.3 Milling costs

The Guyana Rice Millers and Exporters Development Association (GRMEDA) estimates that mill operating expenses range from G\$304 to G\$394 per 110 lb bag of white rice, and G\$326 to G\$358 for cargo rice.

The total ex-mill cost equals milling cost plus paddy cost. In the autumn of 1992 a C grade paddy cost G\$900 per bag. Given that most mills achieve a milling yield of about 60%, 27 bags of paddy would have been required to produce one tonne of milled rice (20.4 bags x 110lb bags). Using GRMEDA's milling cost estimates, the total cost per tonne ranges therefore from G\$30,502 to G\$32,337. This is equivalent to US\$244 to US\$258 per tonne.

2.4 Marketing

2.4.1 Domestic

Domestic consumption is estimated to be around 50 000 MT per annum. This is probably an upper limit: the figure has not been revised since the mid 1980s when it is likely that consumption was much higher, given the lack of availability of wheat products at that time. Data from the Income and Expenditure Survey, which is being carried out this year by the Finance Ministry, should provide data on current domestic consumption of rice.

It is generally the lower quality rice which is unsuitable for export that is sold on the local market. It is a very competitive market and prices are therefore low. This competition benefits local consumers but it means that the industry cannot reduce its export costs by charging a high domestic price. Rice producers in the US are able to do this as a very few mills control the entire domestic supply of rice, allowing them to subsidise export costs through artificially high domestic prices.

As rice production increases, the relative importance of the domestic market declines. Even if annual domestic consumption remains around 50 000 MT, the projected increases in production cannot be absorbed by the domestic market but will have to be exported. As mentioned above, it is anticipated that production of rice will reach 200 000 MT in 1993. Thus Guyana's ability to retain and extend rice export markets is the central marketing issue.

2.4.2 Export markets

a) The FOB price of Guyanese rice

Handling, transportation, stevedoring and fumigation costs increase the costs per tonne to between US\$256 and US\$269 FOB. These costs are high because of the poor storage and loading facilities available in Georgetown. Storage capacity is limited which means shipments are restricted to 4 000 MT maximum, and there is no conveyor belt loading system.

These costs are high relative to other rice exporters. The May 1993 FOB prices quoted for 35% broken white rice from Thailand and Vietnam were US\$186 and US\$167/MT.

b) Shipping costs

Shipping costs from Guyana are also high. Freight charges from the US to Jamaica are estimated to be about US\$25, whilst from Guyana they are US\$65.

c) Export taxes

Guyanese exporters also have to pay export taxes. A 3% commission is charged on all rice exports which goes directly to the Guyana Rice Export Board, a parastatal which performs a marketing and regulatory function. Rice exports to EEC countries are subject to an additional sliding scale tax which increases with the price. This is known as Rice Levy B.

d) Guyana's Protected Markets

Guyana is presently supplying two markets, the EEC and Caricom. Despite high costs relative to world prices, Guyanese rice can compete because these markets are protected.

However protection has not completely insulated Guyana from the recent downward trend in world rice prices, especially in the Caricom market where Guyana faces competition with US PL480 rice. In addition, the worldwide trend towards market liberalisation means that Guyana is unlikely to continue to have access to protected markets in the medium to long term.

Even in the short term, protection cannot be taken for granted: the Caricom heads of state have already agreed to reduce tariff levels on rice to a maximum of 25% from January 1st 1994 and a successful conclusion of the GATT trade talks could lead to a substantial modification of the terms established under Lome IV.

The destination of exports of Guyana Rice by country from 1989-1992 is shown in Table 3.

Table 3: Exports of Guyana Rice by Destination, 1989-1992

Country	Exports 1989		Exports 1990		Exports 1991		Exports 1992	
	MT	%	MT	%	MT	%	MT	%
Jamaica	2146	5	6375	13	3926	7	53441	46
Trinidad	-	-	-	-	3575	7	7426	6
St. Vincent	400	1	500	1	2518	5	3214	3
St. Lucia	1500	4	1219	2	381	.7	495	.5
Barbados	-	-	-	-	-	-	797	.7
Martinique	-	-	1278	2	2944	5	2718	2
Curacao	-	-	-	-	-	-	12518	11
Bonaire	-	-	-	-	-	-	14586	13
Guadeloupe	-	-	-	-	-	-	989	.9
Holland	14090	35	37927	74	36884	68	14417	13
Belgium	12125	30	3501	7	-	-	1393	1
UK	3882	10	-	-	2688	5	3108	3
Cuba	6100	15	-	-	376	.7	-	-
Surinam	-	-	700	1	-	-	-	-
TOTAL	40243		50940		54047		115102	

Source: Planning Division. MOA

e) The EEC market

The EEC market is established under Lome IV which was ratified in August 1991 with effect until 2001. It provides for 125 000 MT of rice and 20 000 MT of brokens to be imported into the EEC by ACP countries on a concessionary basis.

As mentioned above, only a handful of mills in Guyana have the capability to produce the quality of rice demanded by the EEC market. For this reason Guyana only supplies about 40-45 000 MT to the EEC quota each year.

The other ACP country which has traditionally supplied rice through the quota is Suriname. Production has been declining in Surinam in recent years and was 190 000 MT of paddy rice in 1991. Low government prices and a decline in the country's infrastructure are the main reasons given for this decline.

But whilst competition from Surinam may be declining, Guyana faces a new competitor for the EEC quota. The Dominican Republic has started to take advantage of its recent accession to the ACP agreements to start exporting rice. Press reports in the Dominican Republic indicate that exporters are aiming to supply 30 000 MT of the quota.

Despite the quality constraint, in recent years the largest share of rice exports has gone to the EEC which accounted for 75%, 81% and 73% of exports in 1989, 1990 and 1991 respectively. However low production in these years meant that most of the lower quality rice that was produced by the smaller mills could be absorbed in the domestic market.

In 1992 this pattern changed. Direct exports to the EEC dropped to only 17% of total exports, although if exports to Curacao and Bonaire are included the quantity of Guyanese rice reaching Europe was about the same. The major change was the reappearance of Jamaica as a major destination for Guyanese rice, accounting for 46% of exports. Most of this was white rice with 35% brokens, a low quality rice unsuitable for the European market.

The new markets in Curacao and Bonaire opened up as a result of new regulations that came into effect in the EEC under the 1992 Single Market agreements. As overseas territories of the Dutch Kingdom, Curacao and Bonaire are allowed to export industrial and processed agricultural products, if sourced from an ACP country, to the EEC without paying any levies. Buyers in these territories purchase Guyanese rice which they then semi-process and re-export to the EEC. This rice does not constitute part of the ACP quota and actually fetches a higher price, even after the extra shipping and processing costs are deducted.

The share which the rice exporter actually receives depends on the competition to buy and process rice under these arrangements. With only 2 mills operating the scheme at the moment, one in Curacao and one in Bonaire, the share of surplus profits accruing to the exporter is quite small. The premium received by exporters going through Curacao and Bonaire was about US\$40 above the price paid for rice imported directly into the EEC.

Additional incentive to export via Curacao and Bonaire results from the Guyanese government's tax regime. Since 1991, the government has been charging a sliding scale tax, ranging from 0-25%, on all direct rice exports to the EEC. This tax is known as Rice Levy B. Currently the tax is applied to any rice receiving a price greater than US\$300 FOB. Cargo rice destined for Holland in 1992 would have been liable for a tax of about US\$40 per tonne. This effectively doubles the premium received by exporters using the Curacao/Bonaire arrangement under which no tax is due.

f) The Caricom Market

Rice import requirements for the Caricom region were estimated to be about 120 000 MT in 1990. Jamaica accounts for about half of this total and imports white rice almost exclusively. Trinidad imports about 30 000 MT, of which about 25,000 MT is parboiled rice. Total demand in the region for parboiled rice is about 50 000 MT.

The total import requirement of the Caricom region could theoretically absorb Guyana's present level of export production (115 000 MT 1992). Theoretically the existence of the Common External Tariff means that Guyanese rice is protected against other non Caricom producers, giving Guyana a competitive advantage in the region. The tariff is currently 30%.

However as Table 3 suggests, Guyana's share of the Caricom market has been very small in recent years. Exports to the region accounted for 10%, 16% and 19.7% of Guyanese exports in 1989, 1990 and 1991 respectively. This was equal in volume to 4046 MT, 8094 MT and 1040 MT, approximately 8% of the region's import requirements. No parboiled rice was supplied.

It is the United States that has been the main exporter of rice to the region in recent years with a market share of around 80%. Jamaica and Trinidad and Tobago are the most important markets absorbing annually around 65,000 and 30,000 MT each.

US rice entering the Jamaican market is supplied under the PL480 programme. The terms are very favourable for importers: long term concessional credit is provided and repayment may be in local currency. Under PL480 Title III, loans made under PL480 Title I are forgiven if the local currency generated from commodity sales is used to finance development projects.

The generous terms available under PL480 led Jamaica to seek legal justification not to apply the 30% tariff established within the CET for extra-regional rice. At the end of 1991 it was successful in upholding its legal opinion before the Legal Council of the Caricom Secretariat that rice imported under the US PL480 programme should not attract the full tariff. Drawing on provisions established within the 1991 CET Agreement, Jamaica argued that although rice appeared on the list of imports that were ineligible under the CET regulations governing the import of semi-processed materials, PL480 rice was entitled to an exemption because it came in as development assistance. The Jamaican government declared that it would apply a tariff of only 15%, not 30%.

In 1992 increased production in Guyana created a much larger export surplus, a large part of which could not go to the EEC because it did not meet required quality standards. However exports to the Jamaican market surged from 3,926 MT in 1991 to 53,441 in 1992, taking back a large share of the market from the United States.

Guyana's ability to re-enter the Jamaican market and substantially displace supplies from the United States, its major competitor in that market, even when the Jamaicans were only applying a 15% levy, appears to have been directly related to the price of US rice at this time. The price of US long grain rice with 4% brokens was US\$329 in September of 1992, down from US\$368 in March. Application of the 15% tariff would increase the price to about US\$380. The average value of Guyanese exports of white rice to Jamaica in 1992 was US\$329.

During the first half of 1993 Guyanese exports to Jamaica have fallen off dramatically, coinciding with a substantial fall in the price of US rice. In March 1993 the price reached US\$249, a fall of about 35% in the space of one year. Applying the 15% levy, this would make the price in Jamaica equal to about US\$286. Under these price conditions, Jamaican buyers are unlikely to buy from Guyana unless they can push the price down to a level which can compete with the US price.

This is confirmed by export figures to Jamaica up to the end of June 1993 which show that only 7.844 MT of white rice, with an average value of US\$307 per tonne, were exported. In the same period of last year total exports were about 15,000 MT. Millers are reporting that Jamaican buyers are offering only US\$260 per tonne. As indicated above, to cover costs, the FOB price must be between US\$256 and US\$269. Millers will receive zero returns if they sell at the proposed prices.

The situation shows no sign of improvement. In fact information received from the PL480 office in Jamaica suggests that Jamaica is preparing over the next two months to order a further 33 800 MT from the US which would take it to the limit of its PL480 allocation agreed at the end of last year with the US government. Furthermore, it is believed that the Jamaican government will facilitate these imports by reducing the tariff on US imports under PL480 to zero. By these actions, the Jamaican government is effectively squeezing Guyanese rice out of the white rice market. Only strong lobbying at the political level is likely to turn this situation around.

Caricom import requirements of parboiled rice are about 50,000 MT. For many years Guyana has not been exporting parboiled rice, although a small amount was exported to Barbados last year. The parboiled rice market should be targeted by Guyanese exporters. However this would require substantial investments in new processing facilities as parboiling capacity has substantially deteriorated in recent years.

3. PART 2: PROBLEMS FACING THE RICE INDUSTRY

Low returns to farmers and the difficulties facing millers in finding export markets for their rice are to a large extent two sides of the same coin: paddy production in Guyana is generally inefficient and quality is low. The reasons for this are explored below.

The challenge for the government is to develop policies to overcome these problems and improve yields and quality, simultaneously boosting the incomes of rural producers and guaranteeing an export market for Guyanese rice.

3.1 Reasons for the low productivity and poor quality of paddy

3.1.1 Red rice

Red rice is a major problem in Guyana. It is actually wild rice and can either be introduced into the field through contaminated seed, or it may already be present or it can lie dormant for several years. Efficient water control and field levelling help control it or it can be manually weeded out, a process known as "rogueing".

At present much Guyanese rice contains a high proportion of reds, eliminating it from competing in the EEC market.

3.1.2 Limited choice of improved varieties

During the 1970s, much research was done on improved varieties but since then only one new variety has been released. Improved varieties can be developed both to boost yields and to resist pests and diseases.

The lack of new varieties in recent years has meant that pest and disease control have become more difficult. This has had an impact both on paddy yields and quality as insect infested paddy has a high percentage of damaged grains. It is also unsuitable for parboiling as the infested grains turn black during the parboiling process.

3.1.3 Inadequate availability of machinery

Paddy is very sensitive to the correct timing of operations. Poor water management will encourage red rice and delayed harvesting will make the grains more prone to shattering during the milling process, yielding a rice with a high percentage of broken.

The timing of operations itself is dependent on the availability of the required machinery, given the highly mechanised nature of Guyanese rice production. Farmers who own their own equipment are able to plan operations at the optimal time but those dependent on hired services are in a much more vulnerable position, especially in areas where there is insufficient equipment available.

3.1.4 Deteriorated Drainage and Irrigation Systems

Efficient water control is essential to successful paddy production. But in many areas of the country the system has almost completely collapsed as a result of inadequate funding for many years and a cumbersome institutional structure that fails to set out clear lines of responsibility for operation and maintenance works. Farmers are almost completely excluded from participating in the system.

As a result, efficiency of water use is very low and yields are severely affected. Estimates vary as to the potential of improved water management for boosting yields but on farms where the system has been improved, yields are about 35% higher than the national average. The World Bank estimates that yield increases of up to 50% would be possible with improved drainage and irrigation.

3.1.5 Liquidity problem

a) Working capital

Very few farmers obtain credit from the banks to finance their working capital requirements. Gaibank, which is the major source of working capital lending for paddy farmers, only lent credit sufficient to finance just over 6% of paddy production in 1992. Farmers are therefore dependent on payment from one crop to finance the planting of the following one, unless the miller is able to advance the inputs the farmer needs, which is the practice at some mills. Without this arrangement and where millers are slow to make payments, the farmers face a serious cash flow problem which may prevent them planting a second crop.

The reason for the delay in payment by millers is the problem they themselves experience in receiving payment for rice that is exported. Rice that is sold on the domestic market is purchased for cash. The biggest millers with established export markets also receive cash down payments as buyers are confident of the quality of product they are purchasing. It is the millers who are new to the export market that are facing the most problems with payment. Buyers have experienced problems with the quality of rice purchased and as a result will only pay 50% of the price on delivery to port in Georgetown, delaying the other payment until rice reaches its final destination and the quality of the rice is independently verified. If the quality fails to meet this test, a lower price is paid.

The miller clearly has a cash flow problem. In addition he carries some risk: the final price he receives for his rice may not be the amount he was anticipating and which provided the basis for calculating the price he would pay farmers. This may be because of quality problems or because of movements in the international price of rice.

The need to address this problem has been highlighted in recent weeks (July 1993): millers are estimated to be holding 38 000 MT of stocks because there is no profitable export market for rice. G\$750 million is said to be owed to the farmers, many of whom will not be able to finance a second paddy crop as a result. Improvements in the quality and competitiveness of Guyanese rice will also help to solve the short term liquidity problem in the industry. Confident that millers have secure export markets, lenders will advance them the money they need to pay farmers. Government however should not try and force the banks to lend to millers to pay farmers.

b) Investment capital

Small and large farmers and millers have complained that they have great difficulty in raising project financing from the commercial banks, despite the fact that the banks are holding excess liquidity at present. The reasons for this may be institutional: the commercial banks have little experience of lending to the private agricultural sector. Their ability to carry out credit analysis is therefore limited, quite insufficient to screen large numbers of applicants for relatively small loans and they have very few rural branches. The banks also apply strict collateral policies which effectively screen out all but the biggest potential applicants.

3.2 Problems at the milling stage

Poor paddy quality is often compounded by inefficiencies at the milling stage.

3.2.1 Poor grading of paddy

If millers do not grade paddy well, different qualities are mixed and the quality of the final product will be lowered.

3.2.2 Inadequate storage and drying

Paddy from the fields has a high moisture content as a result of which it cannot be stored for long without deteriorating. Drying is essential. Traditionally millers have used concrete drying floors but the unpredictable climate means that it is often difficult to dry all paddy before the rains.

Another problem is that if solar drying is not carefully managed, the grains are damaged and may shatter during the milling process. Millers also complain that it is difficult to find people to carry out the work as it is heavy manual work. As an alternative they would like to use mechanical dryers but to purchase these they require loans. Many millers complain of problems in obtaining credit.

Adequate storage facilities are also very important. Most paddy is stored in bags in bonds. These are often poorly constructed, leading to problems with rodents or rain water.

3.2.3 Quality of milling equipment

Modern milling systems achieve a much higher paddy/rice ratio and lower percentage of brokens. They can also sort grains. The IDB Industrial Reactivation Loan did allow the modernization of about half the countries mills but most remain without mechanical dryers and sorters.

3.3 Marketing

Low productivity pushes unit costs up whilst poor quality production depresses the unit value. From a marketing perspective, the competitiveness of Guyanese rice is further eroded by high transport, storage, loading and freight costs as detailed in Part 1.

4. PART 3: ONGOING PROJECTS AND POLICIES TO ADDRESS THE PROBLEMS IDENTIFIED

4.1 The Agricultural Rehabilitation Loan No.839

In a study of the agricultural sector conducted at the end of the 1980s, the IDB identified the lack of availability of imported inputs and especially field equipment as the major constraint to the improved performance of the rice subsector. A deficit of about 200 tractors and 40 combines was identified and the lack of availability of foreign exchange was considered to be the main constraint on purchase. The loan therefore made US\$14 million available to dealers to purchase foreign inputs, and granted them a 90 day interest free period in which to repay.

In practice, draw down on this loan has been very slow, especially for the purchase of tractors and combines. The major constraint has been the difficulty encountered by potential purchasers in finding financing. High interest rates until the end of 1992, combined with strict demands for collateral, have made it very difficult for farmers to get loans. The Project Coordination Unit at the Ministry of Agriculture for the 839 loan has made several proposals to the IDB to accelerate draw down on the loan but no agreement has been reached to date. The loan expires in April 1994.

In addition to the problems experienced in obtaining credit, the very cumbersome procedures established to disburse the loan appear to have been a disincentive to some applicants. According to dealers involved, the placing of an order is followed by several months of delay before final delivery. For a farmer in urgent need of new equipment, this delay carries a high cost and discourages him from taking advantage of the scheme.

It should be added that when the loan conditions were originally devised, the costs of these delays would have been at least partially offset by the benefit of having access to foreign currency, which was then in limited supply. Subsequent government policies which have created a free market in foreign exchange mean that this incentive to participate in the scheme has been lost.

4.2 Industrial Reactivation Loan, IDB loan no.154

As mentioned above, this loan included financing for the upgrading of milling equipment. About US\$10 million was made available through Gaibank. Borrowers were charged the base rate of interest and bore the full exchange risk.

The loan has now expired. In all, 58 millers took advantage of the arrangement, borrowing a total of US\$7.5 million. Unfortunately about 90% of the borrowers have run in to difficulties in repaying the loan because of the exchange rate depreciations which took place just after many loans were taken out. As mentioned above, one of the loan conditions was that the borrower would bear the exchange rate risk. As a result of this, many millers are severely indebted, limiting their capacity to take out loans for new investments.

4.3 IDB Agricultural Sector Hybrid Loan

Though this does not make any resources available directly for the rice subsector, included within the loan agreement are provisions to recruit international consultants to carry out a number of studies which will affect the subsector.

One of the studies is on rice, focusing particularly on the level of competition in the domestic rice market and the trade distortions faced by rice exporters. Although a consultancy company has been selected, at the time of writing no date for the commencement of the study has been given.

A study is also to be done on water management. It is not known when this will begin.

4.4 IDB Financial Sector Reform Programme and the IDB Agricultural Support Services Programme

The details of these programmes are still to be devised but the former will certainly address the need to increase the flow of finance to the agricultural sector. The Agricultural Support Services Programme will include provisions for financing small farmers through a joint IDB/IFAD programme.

4.5 FAO/UNDP support for the National Agricultural Research Institute (NARI)

FAO/UNDP has been supporting the work of NARI since 1986 by providing financial assistance with staff development and technical support for research programmes and documentation services. In April 1992 Phase II of this programme was begun and it will run until December 1993. FAO/UNDP is also sponsoring a Quality Seed Development project.

5. PART 4: CONCLUSIONS AND RECOMMENDATIONS

Successful future development of the Rice Industry is dependent on Government taking initiatives in two broad areas: in marketing and in improving productivity and quality.

5.1 Marketing

Given the fact that Guyana is facing increased competition even in protected markets. Government needs to deploy all its diplomatic and administrative resources to maintain the market position of Guyanese rice. Specifically it should:

5.1.1 Fight to keep the Jamaican Market

Given the importance of the Jamaican market to Guyanese exporters, the Guyanese government must make strenuous efforts at the highest level to keep the market open. Jamaica's decision to waive the 30% tariff has been upheld by the Caricom Secretariat but the Guyanese government can challenge the ruling.

The government should also produce a technical paper to take to USAID and PL480 in Washington, demonstrating that subsidised US rice entering the Jamaican market under the PL480 programme is undermining Guyana's efforts to develop a competitive rice industry. The multilateral institutions should also be lobbied to put pressure on the US government.

5.1.2 Market intelligence

This must be improved. Sufficient funds are available from the 3% levy charged by GREB on all rice exports to strengthen its marketing capacity. As well as seeking new markets, it should give priority to monitoring the development of the rice industry among competitor rice exporters in existing markets and following developments at international fora.

Strong links must also be maintained with Guyanese representatives on trade missions and at Caricom, the EEC and GATT. Effective marketing also requires that representatives for the industry are able to travel regularly to meet with prospective buyers and negotiators at the EEC, Caricom and in GATT.

5.1.3 Fiscal Arrangements

These need to be reviewed. Rice Levy B contributed to a fall in Guyana's share of the EEC quota in 1992 as exporters switched their sales to Curacao and Bonaire. A review of the tax is also required given the recent decline in prices. Very little rice has actually been liable for Rice Levy B in 1993 because prices have fallen below the tax threshold level. If government wishes to continue to raise revenue from rice exports, it should consider applying an equal rate on all export sales as this will not disrupt export patterns.

5.1.4 Parboiled and Packaged Rice

Markets exist in Caricom for exports of parboiled and packaged rice, both of which are higher quality products that can give a better return. However to supply these markets, millers will need to invest in new facilities. Government should assist them by providing a special line of credit as well as good marketing information.

5.2 Improving Productivity and Quality

Unless improvements in productivity and quality are effected very soon, all the efforts of an efficient marketing strategy will be wasted as Guyanese rice will be uncompetitive, even in the protected markets of Caricom and the EEC.

Some producers, particularly the larger ones, have already taken the initiative by investing in improved production systems to boost yields and quality.

Government need not worry about these producers, although it should do nothing to hinder their efforts to become more productive. Instead it should focus its efforts on ways to boost the productivity of smaller farmers. Increased productivity will also boost the incomes of small producers.

5.2.1 Drainage and Irrigation

Of greatest importance is a major initiative to rehabilitate the Drainage and Irrigation system. The IDB study may produce some useful recommendations but the government needs to develop a coherent strategy for reform of its own. This must address the institutional problems in the present system, including questions of legal responsibilities and law enforcement, and the need to ensure farmer participation and cost recovery as central components in a new strategy. Once the government has a clear strategy, it should seek donor assistance to carry it out.

5.2.2 Seed

Efforts already underway at NARI with the support of the FAO/UNDP should ensure that over the next few years better quality seed paddy is available to farmers. Large producers are assisting this process by participating in the seed multiplication programme and their efforts should be encouraged.

5.2.3 Extension Services

An efficient extension service is also vital to improve crop husbandry, particularly the problem of red rice, as well as to advise on the use of new seed varieties, other inputs and on-farm water management. The government needs to act soon to create a new service, working closely with the Rice Producers Association and other producer associations which already have links with farmers.

5.2.4 Milling

a) Investment Financing

As outlined in Part 2 above, the milling stage of production also plays an important role in determining the final quality of the product. Millers need to make investments now in better grading and drying facilities. But many have faced problems with obtaining project financing from the commercial banks to do this.

This may reflect lack of confidence on behalf of banks in the subsector, in which case serious efforts by government to improve productivity and quality in production may be the best way of tackling the problem. The government may also need to request donor financing for a programme to upgrade the mills.

b) Short Term Liquidity

An obvious solution to the cash flow problem is borrowing money: either the miller borrows from the banks to pay the farmers, or farmers borrow from the banks to finance their next crop. Some millers are already borrowing to pay farmers promptly, paying a slightly lower price to farmers to cover the cost of borrowing. In efficiency terms this is preferable: the transaction costs to the banks incurred by a few millers borrowing to pay farmers are much lower than the costs of hundreds of farmers trying to get loans to cover their working capital needs.

There have been complaints though that the commercial banks are not willing to finance millers sufficiently to pay paddy farmers. However their reluctance may have sound financial justification: fears about the ability of millers to produce rice of sound quality and the bleak outlook for profitable export markets this year may make banks doubt whether millers will be able to repay them. Millers are not insured either. So a fall in the international price, or a contaminated shipment, would be a disaster for the miller and the bank.

In the medium term, better quality production at lower prices would be the surest way to increase confidence among bankers that millers could sell their rice abroad. In the short term, millers should perhaps consider introducing a less rigid form of contract with farmers for paddy. They could offer a target price for paddy, based on a projected export price, and make immediate payment of 75% of this price. Payment for the final share would be tied to the final price received for the rice. Such a scheme would be more attractive to bankers as it would give millers some margin to adjust their prices in the event of problems with sales. Similar schemes are operated by buyers in other countries where production is oriented to a world market where prices are unstable.

AN OVERVIEW OF THE NON-TRADITIONAL CROPS SECTOR IN GUYANA

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1. INTRODUCTION

The agro-ecological conditions in Guyana are favorable for the production of many crops, but until now, Guyana's Agricultural Sector has been dominated by sugar cane and rice. Both of these crops are sold overseas and contribute significantly to the economy, i.e over 20% of GDP, over 98% of agricultural exports and over 50% of total exports.

Little attention has been given to the other crops on a regular basis and the potential of many non-traditional crops goes underutilized. This report is a summary of a much more detailed report discussing the present situation on the cultivation of legumes, fruits crops, root crops and vegetables. The best available information on areas planted, crop production (Tables 1-4) and volume and value of exports (Annex 1) are presented. The problems and constraints that affect the cultivation of these crops are highlighted and recommendations for improvement are given (Annex 2).

2. NON-TRADITIONAL CROPS

2.1 Legumes

Legumes traditionally form an integral part of the Guyanese diet and are an important component of livestock feed. The types of legumes grown in Guyana (Table 1) include peanuts (Arachis hypogaea), black eye peas (Vigna sinensis), cowpeas (Vigna sinensis; varieties Minica i, ii, iii and iv), red beans (Vigna sp), mung beans (Vigna radiata), urid beans (Vigna mungo), pigeon peas (Cajanus cajan) and soybeans (Glycine max).

Legumes are mainly planted on sandy loam soils because they suffer from waterlogging. Large areas of legumes are cultivated in the Intermediate Savannahs, Kibilibiri, Linden Highway, North West District and Upper Mazaruni. Large scale production of legumes is mainly done in the Intermediate Savannahs. Peanuts are grown on the largest scale (500 ha), followed by cowpeas (336 ha) while all the other legumes seem to be grown on less than 150 ha.

Land preparation is important for all legumes. The method practiced depends on the soil type and drainage. Land preparation on clay soils is done during the dry season and the land is ploughed two or three times. Cowpea, mung and urid are planted on cambered beds on the coastal clays but not in the "brown sands" areas.

TABLE 1: Estimates of Cultivated Areas of Selected Legumes by Region

	REGIONS (acres)										Total area	
	1	2	3	4	5	6	7	8	9	10	acres	ha
Peanut	200	30	25	70	60	20	600	70	60	100	1235	500
Blackeye	120	70	25	60	40	150	40	15	120	190	830	336
Mung	20	60	80	60	60	45	30	-	-	5	360	146
Urid	30	50	80	40	30	35	40	-	-	5	310	125
Cowpea / Minica	15	10	20	40	20	40	45	10	15	60	275	111
Pigeon pea	10	15	16	12	10	15	10	3	4	15	110	45
Soybean	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	396	237	249	286	225	311	772	106	208	385	3,120	1,263

Planting of legumes should be done so that maturity coincides with the dry seasons (August - November and January - April). The seed used should be of good quality in terms of viability, vigor and varietal purity. Seeds for large scale cultivation are usually obtained from the Ministry of Agriculture. Peanut and soybean seeds may be imported, especially hybrid seed. Quality of locally produced seeds is often poor due to improper grading, handling and storage. It is recommended that peanut seeds be treated with a suitable fungicide before planting for the control of seedling diseases, but this is usually not done.

Crop rotation is practiced in all legume cultivation in the country. Small scale farmers rotate legumes with crops like pepper, vines or other vegetable crops. In the large scale cultivation in the Intermediate Savannahs, cotton and corn were two main rotation crops.

Proper weeding is important as weeds compete with legumes, especially in the first phase of growth. Small farmers on the coastlands use manual labor to control the weeds while production by the state agencies on the Intermediate Savannahs is highly mechanized. Weed control on large fields is done by pre-emergence herbicide application combined with inter-row cultivation.

Most of the nitrogen needs of legumes is provided by the root nodules of the leguminous crops and in general only phosphorus fertilizer has to be applied. The poor nutrient status of the sandy soils however demands a mixed fertilizer. Application of fertilizer, when done, is carried out in split applications during the first stages of growth. Liming may be necessary, depending of the soil acidity and type of legume. This is particularly necessary on the sandy soils, e.g. Kairuni and the Intermediate Savannahs. Limestone should be incorporated into the soil 4-6 weeks prior to planting.

A wide range of pests and diseases affect legumes. The actual yield loss and reduction of seed quality caused by pests and diseases can be considerable. Pests seem to cause most problems and these include crickets, cutworms and other insects.

Weather conditions (dry conditions are favorable) and maturity stage of the crop are two important factors in harvesting legumes. Peanuts are more prone to fungal infections when harvested too early. Pulses are very susceptible to shattering and should therefore not be harvested too late. It may be necessary to harvest several times as not all pulses mature evenly.

Drying is crucial to obtain good quality peanuts. It should be done rapidly to prevent fungus growth and formation of aflatoxin but at the same time drying has to be controlled to prevent excessive spoilage and splitting when the nuts are shelled. Drying of peanuts is most commonly done on sheets or on a concrete floor where possible. Peanuts are stored in plastic bags, although jute bags are preferred. While it is recognized that all efforts should be taken to prevent contamination and provide good storage conditions (odor free atmosphere, low temperature and circulating air) storage and transport of peanuts takes place under unfavorable conditions. Peanuts for seed production are stored in shells.

Post harvest losses of legumes are mainly caused by fungus growth, storage insects, rodents, improper packaging and rough handling during transportation.

The prospects for legumes look favorable if more lands are allocated to such production, more prolific cultivars introduced, pests and diseases controlled and the right amount of fertilizer applied for certain soil types. Quick availability of all essential inputs could contribute to productivity and lower production costs per unit, thus making legumes more affordable in the market place.

2.2 Fruit Crops

Traditionally, the seasonal glut of most fruits presented serious problems to most fruit farmers. Gluts are still common and the potential for tropical fruits will only be developed when technology, transport and storage are improved. The Government is promoting the development of the fruit industry as part of its policies for crop diversification and self sufficiency. The Ministry of Agriculture is giving priority to the

upgrading of selected plant propagating nurseries (1993). There is a positive outlook towards the increased commercialization of a wide range of tropical fruits especially pineapple, citrus, West Indian cherry, passion fruit and carambola.

The most important fruit crops in Guyana are pineapple (Ananas comosus), citrus fruits (Citrus sp., including sweet orange (Citrus sinensis), tangerine (Citrus reticulata), grapefruit (Citrus paradisi), West Indian lime (Citrus aurantifolia) and shaddock (Citrus grandis)), passion fruit (Passiflora edulis f. flavicarpa), West Indian cherry (Malpighia punicifolia), mango (Mangifera indica), carambola (Averrhoa carambola), avocado (Persea americana), guava (Psidium guajava) and cashew nut (Anacardium occidentale).

Pineapple and Citrus are the most important fruits grown in Guyana in terms of acreage and production (Table 2). Guava, mango and cashew nuts are not grown with a high level of inputs but they give a steady production. Carambola became an important crop twenty years ago coinciding with the ban on imported goods. Although common in back yards, it has lost much of its popularity as markets did not develop. West Indian cherry and passion fruit have gained popularity during the last five years, mainly as crops for the production of fruit juices. The production of avocado and papaw is small and fluctuating due to production problems.

Citrus fruits and pineapples are both grown on a total acreage in the range of 480 ha. The main production areas for pineapples are the Canals Polder (Region 3) and the Linden Highway areas (Region 4). The North West District (Region 1), Pomeroon (Region 2), Essequibo and Demerara (Region 3) are the main citrus growing areas. Carambola is estimated to be grown on 120 hectares, followed by guava, mango, West Indian cherry, papaw, avocado, cashew nut and finally passion fruit (35 ha). Many fruit trees are also grown on a small scale, e.g. around homesteads.

Land preparation for the cultivation of fruit crops is usually done by ploughing followed by harrowing. This is done in the dry season for clay soil. Ploughing is not always done, especially when pineapple or cashew nuts are cultivated on sandy soils. In this case the vegetation is removed by cutting and burning.

The necessity for the construction of drains is related to the permeability of the soil. Drains are usually not required on sandy soils, but they are essential on clay and pegasse type soils as most fruit crops do not tolerate waterlogging. Carambola is the only fruit crop that is somehow resistant to waterlogging. The beds constructed in between the drains tend to have a more cambered shape on heavier clay soils when the drainage is poor. Construction of mounds is sometimes practiced after ploughing the land, for large scale cultivation of fruit crops. Construction of mounds without ploughing is common practice when fruit cultivation is done on a smaller scale. Holes are dug for the construction of mounds and, when available, filled with a mixture of organic manure, lime and/or inorganic fertilizers (especially phosphate fertilizers).

TABLE 2: Selected Fruit Crops by Area (Ha) and Location

	Area (ha)	Main production areas
Pineapple	485	Linden Highway, West Demerara (Canals Polder, Naamryck) and the Essequibo coast and islands.
Citrus	482	North West District, Essequibo Coast, Islands & Pomeroun, East Demerara, East Berbice, Upper Demerara and West Demerara
Carambola	120	Pomeroun and Essequibo coast areas
Guava	113	Essequibo coast, Black Bush Polder
Mango	110	Rupununi, Essequibo, Corentyne coast, Black Bush Polder and Buxton
West Indian cherry	90	Regions 4, 3 and 1
Papaw	86	Pomeroun and Crabwood Creek areas
Avocado	83	North West District, Hosororo and the Canals Polder
Cashew nut	65	Rupununi and sandy soils of the coast
Passion fruit	35	Regions 4 and 5
	1,669	

Many different varieties or types of fruit trees are cultivated. Most of them have not been classified. Distinction between types of fruit crops is usually made based on certain characteristics, e.g. flavor (sweet and acid carambolas), shape and color (pear, round, oval guavas with either pink or white flesh). Citrus, pineapple, avocado and mango are fruit crops with some identified varieties, many of which were imported years ago. Some of these cultivars have lost their homogenous characteristics due to crossing with other varieties. Montserrat (90%) or sugar loaf (5%) are the main varieties used in pineapple cultivation. Germplasm collections set up in the past are almost non-existent due to lack of maintenance. These should be improved and updated with new varieties, certainly when export is considered.

Propagation of fruit crops may be done by generative (seeds) or vegetative means (cuttings, grafting, marcotting, layering etc.). Seedlings are the usual planting material in small scale production while planting material propagated in nurseries by grafting etc. is used in larger scale production. Advantages of generative propagation is that fewer diseases and pests are transferred by seedlings to the new plant and that more plants may be produced within a certain period (e.g. passion fruit). Propagation by seedlings

however often results in a heterogenous offspring (e.g. carambola) because no homogenous parent material is available. In that case vegetative propagation may be preferred. The availability of seeds is not a problem for some fruit crops as they produce fruits year round or at least several times per year (carambola, passion fruit) in combination with a seed viability long enough to overcome the fruit absent period. Some fruit crops (e.g. avocado) produce seeds with a short viability and need to be planted soon after harvest.

Vegetative propagation is especially recommended for commercial cultivations so that a homogenous offspring with certain desirable characteristics is produced. An added benefit is that trees such as mango and avocado come sooner into production. Pineapple is mainly propagated by vegetative means (usually slips) and most farmers produce their own planting material. The National Agriculture Research Institute (NARI) has recently started to produce pineapple plants from tissue culture on a limited scale.

There are several government nurseries in the country but all are poorly equipped and managed. Shortages in disease free planting material (e.g. Tristeza virus free material in case of citrus) and budwood are common. As a result, propagation material is not available to farmers in the required amounts and some large scale farmers have initiated their own nurseries.

It is recommended that most fruit crops be grown in rows, to facilitate weeding, trellishing (e.g. passion fruit) and mechanical operations. This is usually practiced in large scale operations. Spacing distance varies with the characteristics of the fruit crop and soil type. Intercropping may be practiced during the early years as is often done with pineapple, cashew nuts and mango. Under these conditions the young fruit trees benefit from the care given to the other crop.

The climate prevailing in the fruit growing areas in Guyana favors weed growth, resulting in serious competition between weed and fruit crops, especially during the early stages of growth. Fruit trees are hand weeded two to three times a year where farmers are actively engaged in commercial production. Sometimes mechanical weeding is practiced. The use of herbicides is not common practice as it is considered expensive. Passion fruit has a shallow root system and should therefore be weeded carefully; mulching is recommended. Mulching of papaw is recommended on sandy soils. Another method of soil conservation that suppresses weeds growth is the cultivation of a cover crop. The use of a cover crop in avocado production has proven beneficial for weed control.

Recommended fertilizer rates depend on the soil type and the fruit crop grown. Sandy soils are usually more deficient in nutrients and demand more fertilizer for optimal growth. Trace elements may have to be applied in the case of citrus fruits; other crops such as carambola are also reported to suffer from deficiency of micro nutrients. The application of fertilizers to fruit crops is not common in Guyana. The more commercial

crops, pineapples for example, are sometimes fertilized. The application of fertilizers however is not always optimal as soil requirements are often unknown to farmers and appropriate formulas are difficult to obtain. Deficiencies of nutrients are often related to a low soil pH. In general, an application of limestone increases crop production because of the amount of acid soils in Guyana. It is applied when available.

Many pests and diseases affect the cultivation of fruit crops in Guyana. These include insects and fungal diseases, as well as viruses which seem to affect the cultivation of certain fruit crops to a large extent. One of the main problems in pineapple cultivation is the "ant-mealybug complex" - the mealybug serving as the vector for a viral wilt disease. Tristeza virus is a serious problem in citrus cultivation resulting in gradual dying of the entire tree. In both cases, control of the vector is important in combination with the use of virus free planting material. Anthracnose is a serious fungal disease in mango cultivation. The Carambola fruit fly, which hampers fruit cultivation in Suriname at the moment, is a serious threat to the fruit industry in Guyana because of its wide host range, affecting carambola, mango, guava and West Indian cherry and several other fruit crops. Animals also affect fruit cultivation; birds are reported to cause problems in carambola. Many farmers in Guyana are not properly trained in the use of pesticides and other chemicals. This is a reflection of the weakness of the extension system. Improper use of pesticides is dangerous to farmers, consumers and beneficial flora and fauna. West Indian cherries are harvested on a regular basis and no pesticide residues should be left in the produce. Use of insecticides in passion fruit may kill the pollinators, thus causing yield reduction.

Proper pruning and training is a requirement for the production of high quality fruits on most fruit trees. Pruning is most important during the first year of growth when the framework of the tree is being established (e.g. citrus, West Indian cherry, avocado). Pruning in the later stages includes removal of dead and undesired branches, as well as water suckers/sprouts in the case of grafted trees (e.g. citrus). Some trees need to be trained into a certain shape (e.g. passion fruit, West Indian cherry). Passion fruit plants should be trained in such a way that pollination by insects is not hindered. Proper pollination, possibly by hand pollination, increases the yield substantially. Farmers hardly prune non-commercial crops such as guava. Relatively few fruit farmers in Guyana practice the appropriate pruning techniques. This is due to the unavailability of technical assistance and low farm gate prices. Poorly pruned trees contribute much to the poor quality of fruits offered at markets.

Harvesting of fruit crops is often a reflection of market conditions. The stage of ripeness of the fruit is not always reflected in the color of the fruit (some citrus fruits), but farmers are able to determine the maturity of fruit by other characteristics. The market opportunities determine the stage at which the fruit is picked. Pineapples for the local market are harvested in a more mature stage than those for export. Passion fruits are picked when fully mature, otherwise they may produce off flavor juices. Harvesting of fruits is done by hand. Ladders may be used to reach the fruits or persons may have to

climb the trees. Passion fruits are allowed to drop and are picked up from the ground. West Indian cherries may be harvested by picking or are shaken off the trees. Mangoes are sometimes harvested by having boys climb the trees and throw the fruit to others on the ground. In some cases fruits are picked with poles. A common practice is that of shaking the trees, which bruises the fruits. Mangoes are normally harvested when not fully mature and left to ripen. Papaw fruits are harvested by twisting the fruit off the tree; a cutlass is sometimes used; clippers are never used.

Some fruits such as citrus, pineapples and passion fruits are graded on the farm. Fruits are placed in baskets, bags, crates etc., sometimes lined with dried leaves, and transported to the market. Fruits for the export market are treated with more care than those for the local market. Grading for mangoes is not done properly. A high percentage of fruits may be of low quality. Vendors sell mangoes by the parcel to be able to sell the damaged fruits together with the good ones.

Post harvest losses are a direct reflection of the conditions during cultivation, harvest and postharvest handling. These conditions are often very unfavorable in Guyana due to the scattered nature of farms, bad roads and frequent handling into and out of boats and vehicles. Farmers try to market the maximum amount of produce, but they will also carry out some grading because they know that it may increase their profits. Grading and packing is normally done in the open as few farmers have special facilities or equipment for grading and packing.

Rough handling results in bruising and crushing of fruits during transportation, especially for soft fruits such as carambola. West Indian cherries spoil easily when large amounts of fruits are piled together. Post harvest losses of citrus fruit have been estimated as low as 2.5%. Large amounts of pineapples are infected with internal rots that are only detected after harvesting and handling. It is estimated that post harvest losses for pineapple can reach 40% or higher. Losses for passion fruit tend to be low (less than 5%) but high for carambola (20-50%) and avocado (15-40%). In reality, the post harvest losses range from very low to very high depending on the particular circumstances under which the crop is grown and marketed.

Most fruits are sold fresh on the local market. Only a few small scale fruit processing facilities exist. These produce a variety of fruit juices, jam, jellies, dried fruits etc. Some fruits on the local market have a high price (e.g. citrus, pineapple) in comparison to the average income in Guyana and international prices for these fruits.

Pineapple is the most important fruit exported both in the fresh and processed forms. Guyana has a thriving fresh fruit market in Barbados, and with an expansion in cultivation and a better quality of pineapple this market could be extended. In 1992, exports of fresh pineapple (mainly to Barbados) exceeded US\$100,000. Exports of processed pineapple chunks to Trinidad was approximately US\$60,000 (Annex 1).

2.3 Root Crops

The principal root crops grown in Guyana include cassava (Manihot esculenta), eddoe (Colocasia esculenta), yam (Dioscorea sp.), sweet potato (Ipomoea batatas) and tannia (Xanthosoma sagittifolium).

Root crops are a popular domestic food and an important source of carbohydrates. Cassava is the staple food for the Amerindians in the interior districts from which cassava bread, casareep, starch and local drinks are produced. Root crops are grown throughout Guyana on a wide variety of soil types and under different ecological conditions. Production and productivity vary greatly with individual farmers as related to their own initiative and practical experience from on-farm trials.

Production of root crops increased significantly between 1983 and 1987. Production decreased again from 1988 onwards, both coinciding with the restriction that was placed upon the importation of flour. Only very small amounts of root crops are exported (Annex 1).

Cassava is the most important root crop grown on the sandy soils. It is either classified in Guyana as 'bitter' or 'sweet', referring to the hydrocyanic glucoside (HCN) content in the tubers. A total estimated area of 2045 ha is cultivated with cassava (Table 3), of which more than half is planted with sweet cassava. At the moment, the potentials for expansion of cassava production, especially bitter cassava, look favorable.

Eddoe is the root crop best adapted to wet environmental conditions. It is commonly grown on the pegasse type soils in the North West. It is the second most important root crop and is cultivated on an area of about 539 ha. An advantage of eddoes over most other root crops is that the corm stores well. Eddoes can be planted under either dry or wet conditions. Water is needed throughout the growing season for lowland cultivation. The water level is gradually raised as the plants develop in such a way that the base of the plant is kept submerged. The fields should be flooded with fresh water. Stagnant water can cause severe incidence of root rot. In the Canals Polder, eddoes are also planted as an intercrop among pineapple.

Yam and sweet potato have the highest market values and their cultivation is more demanding than for eddoes or cassava. Yams need soils that are rich in organic material. Loamy soils are best suited for its growth. It will not tolerate water logging. The crop is staked individually, pyramidal or by the trellis method. The cultivation of sweet potato has slowly increased while the production of other root crops show varying trends. The area cultivated with sweet potato (283 ha) and yam (215 ha) is smaller than that for cassava and eddoes.

TABLE 3: Selected Root Crops by Estimated Area (Ha) and Location

	Area (ha)	Main production areas
Cassava	sweet: 1085 bitter: 960	North West District, Pomeroon River District, Essequibo islands incl. Bartica, East Bank Essequibo, Demerara River District incl. East Bank Demerara, Corentyne River
Eddoe	539	West Demerara Region, Barima River Basin, North West District and Corentyne River Area
Sweet potato	283	Barima Area, Pomeroon Area, Essequibo Islands, West Coast Demerara
Yam	215	Barima-Waini Area, Essequibo Coast & Islands, Pomeroon and Demerara/Mahaica
Total	3083	

Most research on root crops in Guyana has been carried out on yam, especially on the selection of cultivars and the production of virus free planting material. Yam species cultivated in Guyana include Lisbon yam (*Dioscorea alata*), negro yam or Guinea yam (*Dioscorea rotundata*), chinese yam (*Dioscorea esculenta*) and cush-cush (*Dioscorea trifida*).

Local varieties of sweet potatoes are grown throughout the country, particularly in the North West District and the Pomeroon. A total of 14 local cultivars have been collected for classification. In the past, some varieties were imported as well.

More than 20 varieties of cassava are found in Guyana. From experiments conducted on the yield of several varieties, it appeared that the highest yielding local variety ('bad woman') produced 27 tons/ha of fresh roots while the highest yielding imported variety yielded 46 tons/ha. The most common local varieties planted are 'Uncle Mack', 'Butter Stick', '4 Months', 'Chinese Stick' and 'Del Pias'.

Ploughing is beneficial for root crops as it will loosen the soil for the roots. In the case of sweet potatoes it should not be too deep as the roots will grow long and slender. Ploughing is followed by harrowing while ridges (for yam) or cambered beds (sweet potato and cassava in case of poor drainage) may be constructed. Land preparation is done during the dry season. Soon after planting, mulch should be applied to yam. Mulch is also beneficial to eddoes as it helps to conserve moisture and reduces the temperatures around the set. Farmers in Guyana are, in general, aware of the recommended practices for cultivating root crops and practice those methods that are within their means.

Propagation of yams is usually done by small tubers or pieces cut from the head, middle or tail of large tubers. Planting material for eddoes may either be corms or stem cuttings.

Stem cuttings give higher yields than corm setts. In the case of sweet potatoes, tubers or vine slips are used as planting material. Cassava is propagated by cuttings from the mature stem (stick) of the plant. There are three methods for planting: horizontal planting, angle planting or vertical planting. There is no documented evidence that any of these methods has an advantage over the other.

Weeds only cause problems to root crops during the first stages of growth. Hoeing is done with hand tools. Careless hoeing damages the roots, especially in the case of dryland cultivation of eddoes. Flooding controls weeds in wetland cultivation to a large extent. In some cases, herbicides are added to the irrigation water. Mulching, when applied, prevents weeds to some extent. Chemical control with pre-emergence herbicides are practiced by few farmers.

Yams, eddoes and sweet potatoes are reported to respond well to fertilizer applications. Eddoes have a high requirement for potassium and calcium. Sweet potatoes also require relatively large quantities of potassium. The application of fresh manure should be avoided with sweet potatoes as it causes the vines to develop large rough roots. In general, the application of fertilizers in the production of root crops is minimal.

The most serious disease in yam is caused by one or more viruses that weaken and destroy Dioscorea trifida plants. This disease is common throughout the tropics. Nematodes cause problems in yam cultivation.

Leaf blight (Phytophthora colocasiae) and soft rot (Pythium sp.) are the main diseases affecting eddoes.

The sweet potato weevil (Cyclas formicarius) and the sweet potato stem borer (Megastes pusialis) sometimes severely affect sweet potato production as the insects bore holes in the tuber, thus opening it for secondary infections.

Cassava cultivation is affected by leaf cutting acoushi ants (Acromyrmex sp.), the cassava shoot fly (Silba perezii) and thrips (Cocymothrips stenopterus), during dry periods.

Clean planting material is a necessity for all root crops, but it is often unavailable due to difficult and costly transportation. Crop rotation should be practiced more frequently, certainly when pest and disease problems arise.

The period from planting to harvest may take a few months to almost a year, depending on the species. During harvest, tubers should be dug or pulled out of the soil carefully. Tubers deteriorate quickly when they are damaged during harvesting. Mechanical harvesting has been studied for yam and appears promising with varieties bred for this purpose. Most harvesting is done manually.

After harvesting, the soil should be removed from the tubers or corms, graded for size and packed in baskets or crates for transportation to the market. Frequently, the damp soil is left on the roots to keep them fresh during storage and add weight when sold. Yams are mainly transported in jute bags. They are very seldom transported in crates, but small quantities are carried in baskets. Sweet potatoes from the hinterland for the city markets are transported in jute bags most of the time; very rarely will sweet potatoes be placed in crates. Storage and transportation of root crops leave a lot to be desired. Tubers are often transported in small boats or ox carts and stored on wharfs for a few days to a week, awaiting larger ships to carry the produce to Georgetown. Bruises and damages occur to the tubers during storage and transportation as the bags are thrown around and piled high. Another factor contributing to post harvest losses is the long period between harvest and selling. Some tubers, especially cassava, deteriorate quickly and cannot be stored long.

Marketing is mainly done on the local market, only a small amount of root crops is exported. The price of the sweet potato varies with the price of other locally grown tubers and also that of the imported white potato.

Agronomically, the potential for root crops production looks promising. With improved productivity and quality some crops seem to have potential for export. However, market opportunities need to be explored and new products be developed (use of bitter cassava, processing eddoe for baby food etc.). One principal constraint is the poor quality as a result of pests and diseases (e.g. yam). These and the high unit costs of production and marketing have to be addressed first.

2.4 Vegetables

A wide variety of vegetables is grown in Guyana. The most important ones are boulangier (Solanum melongena), tomatoes (Lycopersicon esculentum), pepper (Capsicum frutescens), ochra (Hibiscus esculentus), cabbage (Brassica oleracea), mustard (Brassica juncea), pakchoy (Brassica chinensis), lettuce (Lactuca sativa), cucumber (Cucumis sativus), watermelon (Citrullus vulgaris), squash (Lagenaria siceraria), pumpkin (Cucurbita maxima), carila (Momordica charantia), saeme (Lablab niger) and bora (Vigna unguiculata).

Most vegetables are grown on a small scale. Crops such as tomato, pepper, boulangier and ochra are common house-hold vegetables and can be found in most kitchen gardens. The Black Bush Polder is one of the main vegetable growing areas in Guyana with crops such as tomatoes, peppers and cabbage supplying the Georgetown markets. It is estimated that throughout Guyana, an area of little more than 2000 ha is cultivated with the above mentioned vegetable crops (Table 4). Tomatoes are grown on the largest area (377 ha), followed by boulangier (286 ha), ochra (231) and pepper (225 ha). Vegetable are mainly

produced for the local market (Annex 1). There have been attempts to export some of these crops to the North American markets, but no proper organizational structure exists yet for a reliable supply of these vegetables for export. Competition from Mexico and North America is very strong.

Land preparation depends on the scale of vegetable crop cultivation. The area is hand-tilled with a fork in the case of small scale cultivation and ploughed and harrowed for large scale cultivation. Beds are laid out, drains are dug and the soil material is used to raise the beds. Vines are sometimes planted on mounds on sandy soils.

Propagation of vegetable crops is done by seeds. In most cases, local seeds are used, especially for small scale cultivation. In these cases, good fruits are selected and the seeds are removed, washed, graded and dried by the farmers themselves. The seeds are stored in jars; their viability depends on the type of crop and storing methods. Seeds for mustard, pakchoy, lettuce, cucumber and watermelon are generally purchased. Imported seeds may be used for commercial cultivation, for instance with tomatoes and boulanger. Imported cultivars are not always preferred. For instance, local tomato varieties are very popular, as they are hardy and store well. Imported seeds sometimes show a low percentage of germination as they are not always stored under the right conditions. Boulanger, tomato, pepper, and more delicate crops like cabbage, mustard, pakchoy and lettuce are planted in a nursery. Nursery plants receive care so that pests and diseases will not diminish the crop.

Farmers are aware of the importance of crop rotation and this is practiced to a large extent. Crop rotation is used when plants of the Solanaceous family, e.g. tomato, boulanger and pepper are planted, as well as in the case of cabbage, to reduce the incidence of pests and diseases.

Tomatoes for fresh consumption, e.g. imported 'english' seeds, are grown on stakes. Usually one stake is used. Local cultivars are allowed to grow and spread on the ground. Tomatoes and boulanger are heavily mulched during dry weather. This is particularly practiced in the Corentyne area where rice straw is used as mulch material. Squash, carila and saeme are allowed to grow on an arbor. Squash is allowed to spread on the ground in large scale cultivation.

Weeding is mainly done manually, with a cutlass or a long handle hoe. Herbicide is not used on vegetables. However, the sides of drains may be sprayed in the early stages of plant growth when severe weed conditions occur.

TABLE 4: Estimates of Cultivated Areas of Selected Vegetables by Region

	REGIONS (acres)										Total area	
	1	2	3	4	5	6	7	8	9	10	acres	ha
Tomatoes	15	20	90	130	60	500	42	20	18	35	930	377
Boulangier	10	15	40	70	80	400	30	15	20	25	705	286
Pumpkin	30	45	125	80	60	210	30	38	30	40	688	279
Ochra	15	20	50	116	50	210	35	25	15	35	571	231
Pepper	30	40	70	140	40	100	32	35	28	40	555	225
Cucumber	20	30	40	80	20	80	25	25	30	48	398	161
Water-melon	10	12	50	32	30	115	16	30	10	22	327	132
Squash	15	25	32	35	25	90	30	20	15	32	319	129
Mustard	16	25	25	40	30	40	20	15	14	20	245	99
Cabbage	14	22	40	30	15	40	15	10	18	15	219	89
Pakchoy	14	16	25	70	25	15	12	17	16	30	240	97
Lettuce	10	12	15	20	15	10	8	10	18	20	138	56
Carila	5	6	10	8	9	20	10	15	4	10	97	39
Saeme	2	3	10	7	6	15	3	8	3	5	62	25
Total	206	291	622	788	465	1845	308	283	239	377	5,494	2,225

Very little fertilizer is used on vegetable crops, in most cases only a minimum amount of a NPK fertilizer. Organic manure may be applied when available.

Many pests and diseases affect vegetable crops, especially tomatoes, boulangier and cabbages. Boulangier suffers from the lace wing bug. This insect sucks cell sap from the leaves and causes rusty brown colored plants; the leaves eventually dry and fall off. Bacterial wilt, fusarium wilt and viral diseases are a problem in tomato cultivation. Fungal diseases cause rotting of fruits in pepper cultivation.

Harvesting of vegetables is a delicate matter. The produce should neither be too mature as it will cause problems during transportation, nor too green as this does not meet the quality demands of the consumers. Generally speaking, farmers do not exercise much care during harvesting. No special tools are used and vegetables are usually pulled or hacked off the plant. Leafy vegetables are uprooted and the roots and damaged leaves are removed.

Grading of vegetables is common practice. This may be done for size, quality or degree of ripeness. Most vegetables are not handled with care. Boulangers are usually packed in large jute bags. Tomatoes are thrown on a heap, graded, packed in wooden crates or baskets, lined with dry plantain leaves and then transported to the local markets. For cabbages, the bottom of the head is cut off neatly with a sharp knife, damaged leaves are removed, placed in wooden crates and transported to the markets. Grading of the vine crops is done according to quality and size. Cucumbers are placed in bags or crates and shipped to the markets by trucks. Saeme, for export to North America, is graded according to size and quality, packed in small boxes and shipped by airplane.

No reliable information is available on postharvest losses for vegetables. These are relatively low due to the high level of poverty in Guyana, resulting in the willingness of some consumers to accept lower quality produce. Tomatoes are most sensitive to crushing and are said to suffer a loss of 5-10%. Pepper losses can be high if left too long on the shelf. As soon as deterioration starts the whole batch can be affected. At this stage it is necessary to remove all the bad and damaged fruits.

The production of vegetable crops, especially for export during winter months, warrants detailed analysis of product quality on FOB costs. This requires good organization of farmers and improved collaboration between the Ministry of Agriculture, NARI and New GMC.

3. CONCLUSIONS AND RECOMMENDATIONS

The non-traditional crops of Guyana have been and continue to be seriously neglected. Almost no recent research has been done on their cultivation, post harvest problems and marketing. The potential for increasing the production of most non-traditional crops is however good. The agro-climatic conditions in Guyana are favorable for crop cultivation and the productivity and quality can be increased when more serious attention is given to the major constraints.

At the moment, numerous constraints affect most of the non-traditional crops, resulting in low productivity. The principal problems are the unavailability of good quality planting material, the high incidence of pests and diseases and post harvest losses caused by improper handling and transportation (Annex 2). Farmers are not encouraged to produce large amounts of high quality outputs due to the present market limitations.

Relatively little information is available on the present situation at farmers' fields, including cultivation methods and farmers' level of technical and practical knowledge. Some crucial yield reducing factors in crop cultivation may be known (e.g. nutrients, weeds) due to lack of research. In-depth crop analysis needs to be carried out to determine the main factors that impact on yield and profits. The most serious pests and diseases and causes of post harvest losses should also be researched. It is already clear that rehabilitation of germplasm collections of all crops should be a priority, together with the improvement of good quality seeds or planting materials. The quality of most produce can be improved through better packaging and grading. Market opportunities, especially for export need to be researched. Many of the production areas are situated in remote areas without proper infrastructure, like the North West district and the Rupununi area. Research into the most cost effective means of processing, storage and transportation in these areas is required. Development priorities should be given those areas with comparative advantages.

Not all crops can nor should be addressed at once. Given the very scarce human and financial resources, priority should be given to those crops with the best market opportunities, e.g. legumes, pineapple, citrus and those regions having the best infrastructure.

Research and extension services should work together with farmers on the improvement of crop cultivation. The poor status of the extension service is however a main constraint in improvement of crop cultivation. Experts are needed within the Ministry of Agriculture and related institutions who are specialized in the cultivation of specific promising crops such as pineapples and citrus fruits, for research and training of extension workers.

Recommendations can be made for almost all aspects of non-traditional crop cultivation and marketing. They must however be well adapted to the local situation in the cultivation areas and be based on farmers' possibilities and priorities. Farmers have gained a lot of experience in the cultivation of these crops through trial and error. Their knowledge should be the starting point for research, together with information on the crops that is available from research carried out in other countries.

ANNEX 1: Total Production, Cultivated Area, Wholesale Prices and Export of Non-traditional crops in Guyana in 1992.

Note: The estimated average production per acre does not correspond with the production and cultivated area figures. It is presumed that in reality, the 'cultivated area' of crops is higher than estimated below, due to unavailable data on the extent of small scale crop production. The difference in the average annual prices for different commodities from both quoted sources is not explained either. Data are only given when recorded in the source publication. The export statistics are from official sources. Many of these crops exported in small amounts can be considered trial shipments without commercial value. Small exports without US\$ cash return were not included in the table.

Unit	Total production 1992' tonnes	Cultivated area ² ha	Estimated average production ³ lbs/acre	Average annual wholesale price		Export 1992'		
				1992' G\$/lb	1992' G\$/lb	by air tonnes	by sea tonnes	Total US\$
LEGUMES								
Peanut	1764	500	1000					
Blackeye	436	336	800	64	63			
Mung		146						
Urid		125						
Cowpea (Minica)	188	111	800	58				
Pigeon pea		45	800					
Soybean								

Unit	Total production 1992 ¹ tonnes	Cultivated area ² ha	Estimated average production ³ lbs/acre	Average annual wholesale price		Export 1992 ⁴							
				1992 ¹	1992 ¹	by air	by sea	Total					
				G\$/lb	G\$/lb	tonnes	tonnes	tonnes	US\$				
FRUITS													
Pineapple: fresh	8830	485	10,000	16	19	271.72	118.31	390.03	101,495				
Pineapple: proc. ⁵													
chunks													
juice						0.00	192.45	192.45	57,473				
jam						0.00		0.00	0				
Citrus	7209	482	15,000				16.07	16.07	0				
Orange				23	36	0.00	2.27	2.27	902				
Lime				26	17	9.17	0.00	9.17	2,420				
Grapefruit				15	35				0				
Tangerine				14	25	0.30		0.30	120				
Carambola: fresh	2765	120				0.00		0.00	0				
Carambola: proc. ⁵						0.00	1.15	1.15	0				
juice							38.87	38.87	0				
Guava: fresh		113				0.01		0.01	0				
Guava: processed													
cheese							0.18	0.18	0				
puree							0.00	0.00	0				
jam							1.87	1.87	0				
jelly							4.43	4.43	0				
Mango		110			25	5.03	0.00	5.03	1,128				
W.I. cherry		90				0.01	2.16	2.17	728				

Unit	Total production 1992 ¹ tonnes	Cultivated area ² ha	Estimated average production ³ lbs/acre	Average annual wholesale price		Export 1992 ⁴				
				1992 ⁴ G\$/lb	1992 ¹ G\$/lb	by air	by sea	Total		
						tonnes	tonnes	tonnes	US\$	
Papaw		86	4,000			0.00	0.00	0.00	0.00	0
Cassava: fresh		65	5,000							0
Passion fruit		35				0.05				12
Genip						0.56				74
Sapodilla						0.18				51
Banana					5-18	0.19				36
Goldenapple						0.21				33
Mamey apple						0.14				25
Awara						0.12				16
Dunks						0.03				4
Star apple						0.01				2
ROOT CROPS										
Cassava: fresh	30764				9	0.09	0.00	0.09	0.09	13
sweet cassava		1085	10,000							
bitter cassava		960	10,000							
Cassava: processed										
bread						0.07	0.00	0.07	0.07	18
casareep						0.46	2.37	2.83	2.83	2,569
starch							0.40	0.40	0.40	0

	Unit	Total production 1992 ¹	Cultivated area ²	Estimated average production ³	Average annual wholesale price		Export 1992 ⁴				
					1992 ⁴	1992 ¹	by air		by sea		Total
							G\$/lb	G\$/lb	tonnes	tonnes	
Eddoe	tonnes		ha	lbs/acre	11	12	13.04	0.82	13.86	2,575	
Sweet potato					12	12	0.00		0.00	0	
Yam					16	17	0.00		0.00	0	
Tannia						17				0	
VEGETABLES											
Tomatoes		1630	376	7,000	36	42				0	
Boulangier		2641	285	4,000	34	24	6.54		6.54	3095	
Ochro		1506	231	10,000	16	18	0.70	0.00	0.70	199	
Pepper											
hot pepper		1538	225	10,000	50	51	8.47	2.09	10.56	6572	
wiri wiri pep.							4.63		4.63	2706	
crushed pep.							0.21	0.32	0.53	1014	
Bora		2621		10,000	29	16	17.13		17.13	7500	
Cucumber			161	10,000	8	9	0.15	0.00	0.15	25	
Pumpkin		4085	157	10,000	6	7	9.23		9.23	891	
Watermelon		1715	132	10,000	18		0.21	0.00	0.21	64	
Squash			129	10,000	7		0.66		0.66	77	
Mustard			99								
Cabbage		1343	89	10,000	37	47					
Pakchoy			77		4						
Lettuce			56			21					

Unit	Total production 1992 ¹ tonnes	Cultivated area ² ha	Estimated average production ³ lbs/acre	Average annual wholesale price		Export 1992 ⁴				
				1992 ⁴ G\$/lb	1992 ¹ G\$/lb	by air		by sea		Total US\$
						tonnes		tonnes		
Carila		39	10,000			0.01	0.01		0.01	3
Saeme		21				0.67	0.67	0.00	0.67	293
Callaloo				5		3.42	3.42		3.42	1163
Eschallot			10,000	53		0.02	0.02		0.02	16
Other crops										
Heart of palm						797.00	797.00		797.00	765120
Plantain			8,000	8		0.17	0.17	274.50	274.67	40187
Achar						2.10	2.10		2.10	4466
Coconut (dry)			3,000			0.08	0.08	6.82	6.90	1597
Medicinal herb						1.94	1.94		1.94	273
Sweet basil						0.35	0.35		0.35	165
Thyme (fresh)						0.12	0.12	0.07	0.19	163
Dasheen						0.47	0.47		0.47	87
Breadfruit						0.26	0.26		0.26	54
Jackfruit						0.05	0.05		0.05	12
Ginger				19		0.02	0.02		0.02	6
Total export (US\$)										1,013,048

Sources:

- 1: Review of the Agricultural Sector and Annual Report of the Ministry of Agriculture 1992
- 2: Master report of H. Ramdin
- 3: Estimations by Ministry of Agriculture (unpublished)
- 4: New Guyana Marketing Corporation Annual report 1992

* proc. = processed

ANNEX 2: Problems affecting Cultivation of Non-traditional Crops and Recommendations for Improvement.

ANNEX 2.1: LEGUMES: Blackeye peas, Cowpea (Minica i, ii, iii & iv), Mung bean, Urid, Red kidney bean, Soybean, Peanut, Pigeon pea.

PROBLEMS	RECOMMENDATIONS
<p><i>Germ plasm:</i> Germ plasm of poor quality.</p>	<p>A cultivar screening programme should be initiated, especially for resistance to pests and diseases.</p>
<p><i>Planting material:</i> Good quality seeds are not available in the required amounts.</p>	<p>Contract farmers should be used for the production of seed materials, including 'certified' seeds.</p>
<p><i>Soil fertility:</i> Soil fertility and fertilizer requirements are unknown for many areas.</p>	<p>Recommendations on the application of fertilizers for the different ecozones should be improved.</p>
<p><i>Pests and diseases:</i> Pests and diseases cause big losses when they are not controlled. Pesticides and fungicides are not always available at the required time.</p>	<p>The distribution of agro-chemicals in the outlying districts should be improved.</p>
<p><i>Post harvest:</i> Post harvest losses in peanuts are too high; aflatoxin is prevalent.</p>	<p>Establishment of storage facilities on small farms are needed while farmers should be advised on drying and storage methods. A small peanut processing unit is needed at Wauna and the Rupununi Districts.</p>
<p><i>General:</i> Farmers are not well informed on legume cultivation. Costs for large scale production are high compared to the returns. Cultivation in the Intermediate Savannahs needs specialised machinery.</p>	<p>Transfer of information to farmers should be improved through improvement of the Extension Service. More training is essential for the Extension/Education Services and they should be provided with better mobility facilities. Information on crop cultivation may be provided through public channels (e.g. press, radio). Improvement of mechanical equipment is needed for large scale harvesting of peanuts and for shelling cowpeas and peanuts.</p>

ANNEX 2.2: FRUIT CROPS: Pineapple, Sweet orange, Tangerine, Grapefruit, Lime, Shaddock, Passion fruit, West Indian cherry, Mango, Carambola, Avocado, Guava, Cashew nut.

PROBLEMS	RECOMMENDATIONS
<p><i>Germ plasm:</i> There is no proper germ plasm collection available for most fruit crops. Some collections exist, but they need rehabilitation and improvement. Some crops have no identified varieties. Some varieties do not show proper homogenous characteristics. New varieties are needed with different characteristics, with resistance to certain pests or diseases or for export crops, depending on the market demands.</p>	<p>Varietal selection needs to be done among the existing local fruit crops. New genetic material should be imported and screened and adapted to the local situation. Selection of varieties should be done for resistance to the most serious pests and diseases and for qualities as required by the commercial markets. The new selected and identified varieties should be certified. A germ plasm collection should be put in place for all crops. Tissue culture plants should be produced to ensure that the right cultivars are produced.</p>
<p><i>Planting material:</i> The government nurseries are not able to meet farmers' needs. Planting material is not available in the required amounts, quality and characteristics. Seedlings are not homogenous in characteristics. In some papaw cultivations, there are too many male plants in comparison to female and hermaphrodite plants. More investigation is needed into vegetative propagation at nursery level. Planting material carries diseases and pests. Diseases (virus) free bud wood and root stocks are not available in the required amounts.</p>	<p>The government nurseries should be improved concerning equipment and training of personnel. More research should be done on the vegetative propagation of fruit crops. NARI should produce more plants by means of tissue culture for homogenous seedlings and to increase the amount of plantlings. Orchards should be planted for the production of budwood. Farmers should be selected to produce certified clean pineapple plant material. All planting material must be treated before planting.</p>
<p><i>Soil fertility:</i> Good fertilizer recommendations, based on field experiments on different soil types in the country, are not available for fruit crops. The poor nutrient status of the soil on the Linden Highway is responsible for depressed yields and a serious weed problem. It is not known what crops are suitable for cultivation on sandy soils or how soil conditions can be improved. Citrus is affected by micronutrients deficiency on marginal soils. An investigation is needed on fertilizer foliar spray for pineapple cultivation. In case where fertilizers are applied, farmers do not act according to instructions or are not aware of the recommendations for pineapple cultivation concerning amounts of fertilizer, time and methods of application.</p>	<p>Fertilizer recommendations should be developed for different soil types and fruit crops, based on field experiments. The Linden Highway and Intermediate Savannahs should be included in the program. The use of drip irrigation should be examined for that area. Farmers should be involved in the experiments and they should be informed about the recommendations given.</p>

PROBLEMS	RECOMMENDATIONS
<p><i>Pests and diseases:</i> Pests and diseases seriously affect fruit crop production and marketability of fruits. The control of pests and diseases at farm level is hampered by lack of disease and pest free plant material, inputs, equipment and financial constraints. Anthracnose affects the cultivation of cashew nuts, avocado and mango. Avocado also suffers from root rot. Virus diseases affect the production of papaw, citrus and pineapple. Fruit flies affect guava. Acoushi ants hamper the production in sandy areas.</p>	<p>A program should be started to support farmers in the control of pests and diseases. Research needs to be carried out on the occurrence and control of pests and diseases, especially on the control of anthracnose in mango, avocado and cashew nut and viral diseases in citrus, pineapple and papaw and fruit flies in guava. Screening for resistant varieties should be part of the program and the production of disease and pest free planting material. More attention must be devoted to the manufacture and application of the acoushi ant bait.</p>
<p><i>Cultural methods:</i> For passion fruit, the costs for erecting the trellis system of galvanized wire is considered too expensive in comparison to yields. Flower pollination is not optimal resulting in low yields. For pineapple, severe flooding is a problem in the Canals Polder in times of heavy rainfall. Farmers consider costs of production too high compared to the risks and returns. There is lack of harvesting equipment e.g. picking pole for tall trees like mango.</p>	<p>Pruning should be improved and hand pollination may be done for passion fruits. Poor drainage in pineapple growing areas need to be addressed.</p>
<p><i>Post harvest:</i> Most fruits have soft fruit flesh and are prone to damages. In general, the occurrence of diseases, improper handling, packaging and long transportation result in high post harvest losses. Appropriate packaging material, containers and boxes, are not available. Costs of crates and transportation is a severe constraint. Processing of cashew nuts is too tedious and time consuming. There is a lack of suitable equipment for cottage industry processing of mango at Rupununi. The quality of citrus fruits sold at the markets is not high enough, especially for export.</p>	<p>Standards have to be established for harvesting, grading, packing and transportation of fruits. Cheap and durable packing materials should be developed for the transportation of fruits. The produce should be transported to the market or processing facilities as soon as possible. Farmers need to be informed better (by extension officers) on proper handling and packaging fruits for the local markets. Local vendors need to be instructed how to handle fruits offered for sale. Small scale processing of fruits and cashew nuts in the production areas should be improved, especially for mango and cashew in the Rupununi area.</p>

PROBLEMS	RECOMMENDATIONS
<p><i>Marketing:</i> There is not enough information available on the potentials for marketing fruits for export. The quality standards required by the international markets are not met. The present production is not sufficient for export.</p>	<p>Markets for fresh fruit and processed fruit products need to be explored and the quality demands must be linked to research on fruit crop cultivation and to the actual cultivation of fruits. Trial shipments of local fruits should be sent to potential international markets. Special attention should be given to export of crops from remote areas like the Rupununi. The production of fruit crops needs to be increased substantially. Extension workers should work closely with farmers or processors involved in the export business.</p>
<p><i>General:</i> There is a lack of data on the actual situation of fruit production. Recommendations for fruit cultivation, based on proper research, are almost not available, but highly needed. The potentials of fruit crops are not exploited. Resource poor farmers are not able to invest in larger scale production. There is no resource personnel or expert in the field of pineapple agronomy in the Ministry of Agriculture. Extension officers are not well trained in technical aspects of pineapple production. They do not visit farmers regularly and there is very little follow up activity.</p>	<p>Government, non-government agencies and private institutions should form a National Fruits Technical Committee (NFTC) to improve the fruit crops industry. Information on fruit cultivation should be gathered from other countries. Research concerning all aspects from fruit cultivation to marketing should be carried out and information or findings should be translated to the farmers' understanding by an improved extension service, leaflets/handouts and mass media. Seminars and workshops should be organised and demonstration plots be put in place for different fruit crops. A subsidy or credit system for the procurement of inputs should be worked out to increase the fruit cultivation area. Carambola, avocado and citrus farmers should examine the possibility to form a farmers group for cultivation and processing of their produce.</p>

ANNEX 2.3: ROOT CROPS: Cassava, Eddoe, Yam, Sweet potato, Tannia.

PROBLEMS	RECOMMENDATIONS
<p><i>Germ plasm:</i> Quick maturing and heavy yielding varieties of sweet potatoes are not available. A yam germ plasm collection is not readily available.</p>	<p>Breeding for quick maturing and high yielding varieties of sweet potatoes should be carried out. There is a sweet potato variety that matures in 3 months, but the tubers are small. The seed unit and seed improvement unit should include yam in its program. A yam germ plasm collection should be set up and located in each yam producing area, including local yam varieties.</p>
<p><i>Planting material:</i> It is time consuming for farmers to obtain yam planting material. Planting material is often infected with diseases.</p>	<p>Each farmer should be encouraged to have a nursery with clean planting materials. Disease free <i>Dioscorea trifida</i> planting material should be produced. Improved planting material of eddoes and cassava should be made available to farmers.</p>
<p><i>Soil fertility:</i> For eddoes, no specific fertilizer rates are available for different soil types in upland and lowland areas.</p>	<p>Research should be carried out on fertilizer requirements of eddoes on different soil types.</p>
<p><i>Pests and diseases:</i> The main problem in yam production is the incidence of viral diseases, anthracnose and nematodes. This is mainly due to improper sanitary measures for planting material. In eddoes, diseases render about 30% crop loss. The sweet potato weevil and the sweet potato borer are the most important pests. Acoushi ants can ravage the whole cassava crop in a short period of time.</p>	<p>Farmers should be informed about sanitary measures to prevent nematode infection in yam. More studies should be diverted to the disease problems of sweet potatoes. All lands on sweet potato should be put on a crop rotation program. More research on Acoushi ants should be carried out.</p>
<p><i>Cultural methods:</i> Staking of yam is considered expensive. The cultivation of sweet potatoes is not always economical.</p>	<p>Research on alternatives for staking in yam should be carried out while productivity should be increased. A multiple cropping pattern system for sweet potato should be developed to include a crop which that bring in extra revenue.</p>

PROBLEMS	RECOMMENDATIONS
<p><i>Post harvest:</i> Heavy post harvest losses sometimes occur, especially in sweet potato. These are caused by improper harvesting and transportation techniques. Transportation of root crops from the production areas to the market is expensive while prices are sometimes low.</p>	<p>The extension staff should be more involved in teaching harvesting techniques to farmers, especially for sweet potatoes. Special crates should be designed for transportation of root crops. Access roads need to be improved or constructed in root crop cultivation areas. A large vessel is recommended for the services to the North West District routes.</p>
<p><i>Marketing:</i> The potential for exportation of root crops, especially eddoes, seems good.</p>	<p>The export market for eddoes should be examined. More large scale farmers need to be involved in eddo production for the export market.</p>
<p><i>General:</i> Volume and quality of root crop production is relatively low.</p>	<p>Encouragements should be given for large scale production of cassava. The feasibility of mechanized cassava production should be studied. NARI may set out field trials using high yielding cultivars.</p>

ANNEX 2.4: VEGETABLES: Boulanger, Tomatoes, Pepper, Ochra, Cabbage, Mustard, Pakchoy, Lettuce, Cucumber, Watermelon, Squash, Pumpkin, Carila, Saeme, Bora.

PROBLEMS	RECOMMENDATIONS
<p><i>Germ plasm:</i> New varieties are needed for vegetable production, certainly when export is considered, to meet the outside demands.</p>	<p>Local varieties should be screened, local strains should be improved and new varieties should be imported to select or breed germ plasm needed for the export market.</p>
<p><i>Planting material:</i> Farmers often have difficulty in obtaining good quality planting material.</p>	<p>Seeds and nursery plantlings should be made better available to farmers in the regions, at stores and at the Government plant propagation nurseries.</p>
<p><i>Soil fertility:</i> No proper fertilizer recommendations are available for vegetable production.</p>	<p>Simple farm fertilizer trials should be set up in each agricultural Region on different soil types.</p>
<p><i>Pests and diseases:</i> The lace wing bug is seriously affecting boulanger cultivation. Bacterial wilt, fusarium wilt and virus diseases are a problem in tomato cultivation and peppers suffer from fungal diseases.</p>	<p>Research should be done on the pests and diseases occuring in vegetables and transfer of knowledge should be made to farmers.</p>
<p><i>Marketing:</i> There seems to be a potential for export of vegetables, but vegetables are not grown on a large scale and it is not of prime quality. There is not enough information available on the market demands. Local sales of vegetable crops need promotion.</p>	<p>NGMC needs to carry out market surveys to determine export potentials for crops such as boulanger, cucumber, bora, squash and ochra. An agricultural credit system for farmers should be set up for inputs, packing material etc. More local sales promotion should be carried out.</p>
<p><i>General:</i> There is too little interest in vegetable cultivation; vegetable farmers are more or less neglected by the Extension Service.</p>	<p>The Extension Service should be encouraged to give more information to farming communities. Farmer groups may be promoted to facilitate services.</p>

AN OVERVIEW OF THE LIVESTOCK SUB-SECTOR

By: Charles Carmichael (Agricultural Economist)

1. INTRODUCTION

1.1 The Importance of the Livestock Sub-sector in Guyana

The livestock sub-sector is one of great importance in providing the animal protein component in the dietary requirement of Guyana's population. In Guyana, meat, milk and eggs represent some of the major sources of protein available for human consumption. The development of the livestock sub-sector would therefore contribute to the Nation's well-being by ensuring the availability of adequate amounts of livestock products, which should serve to improve the protein intake level and thus the physical health of the population.

Development within the livestock sub-sector would also result in the creation of new job opportunities at all levels of production - primary, secondary and tertiary. Many of the primary products produced in this sub-sector can be processed and marketed, providing employment for a number of skilled and unskilled workers.

At present very little, if any, of the products from the livestock industry in Guyana are exported. The Caribbean region is however one of great export potential both for live cattle and processed livestock products. Improvement and development within the livestock industry could result in livestock products being sold on Caribbean markets, thus providing a useful source of foreign currency for the nation.

1.2 Objectives of the Assessment of the Livestock Sub-sector

In view of the potential significance of the livestock sub-sector to Guyana's economy, an overview of this sub-sector is necessary in order to:

- a) analyse the existing situation within the livestock industry, with the aim of determining the:
 - characteristics of the animal population - number, breeds, structure and quality;
 - regional distribution of the animal population;
 - production trends - demand and supply situation, imports and exports;
 - farm management practices;
 - level of infrastructure and technology employed;
 - utilization of technical and financial services;
 - processing and marketing systems, and
 - the role of Government and non-Government institutions in the development of this area of agricultural production.

- b) identify problems and constraints to production.

The following information is in fact a summary of the main characteristics of the livestock sub-sector, and to a large extent are extracts from a more comprehensive document prepared on the livestock sub-sector by the same author.

2. CATTLE PRODUCTION

2.1 Characteristics of the Cattle Population

Guyana's cattle population of about 261,000 heads is concentrated in the coastal regions. Available data indicates that this represents about 90 percent of the national cattle population. More than half of these animals are located in small herds of less than 50 heads. A few cattle farms are also located on the Interior Savannahs of Guyana, the Rupununi Savannah in Region 9 and the Intermediate Savannah in Region 10.

Table 1 shows the regional distribution of cattle in Guyana. Apart from the regional distribution of the cattle population, Table 1 also shows the structural composition of the cattle population and animal population changes during the period 1988-1992.

A study of this table reveals that the coastal cattle population increased by about 15 percent, from 242,466 to 279,234 heads during the period 1988 to 1990 but declined by 7.0 percent to 260,530 heads of cattle during the period 1990 to 1992.

In Guyana there is no strict classification of cattle as beef or dairy animals. About 41 percent of the cattle found in the coastal regions are adult females. Approximately 15 percent of these cows can be considered to be animals genetically more suited for milk production.

Considering the genetic character of the national herd, it can be said that it is made up predominantly of 'creole' type animals. These are basically the descendants of *Bos indicus* breeds. In most coastal regions there has been the introduction of breeds such as American Brahman, Santa Gertrutis and Hereford to improve beef production and Holstein/Freisian and Jersey breeds as a result of various efforts in dairy improvement. As a consequence, about 10-15% of the national cattle population may be regarded as dairy types, another 60-70% as dairy/beef types while the remaining 15-30% exhibit in general the characteristics of beef types.

2.2 Production Trends

2.2.1 Milk Production and Exports

Over the past 10 years a great deal of effort has been devoted to the developing of the cattle industry in Guyana, notably the dairy sector. The National Dairy Development Programme (NDDP), established in March 1984, has spearheaded the effort to make Guyana self-sufficient in milk production. Table 2 shows the domestic production of fresh milk during the period 1983-1992.

Table 1: DISTRIBUTION, COMPOSITION AND CHANGES IN THE COASTAL CATTLE POPULATION 1988-1992

CATEGORIES IN YEARS	R E G I O N S												
	2	% CHANGE	3	% CHANGE	4	% CHANGE	5	% CHANGE	6	% CHANGE	TOTAL	% CHANGE	
1. TOTAL # OF CATTLE													
1988	13006	-	35926	-	14386	-	77082	-	102066	-	242466	-	
1990	14698	13.0	40127	12.0	12911	-10.3	113306	47.0	98182	-4.0	279234	15.0	
1992	9428	-35.9	35951	-10.4	10669	-17.4	111322	-2.0	93130	-5.0	260530	-7.0	
2. No. of Cows													
1988	4907	-	12346	-	5880	-	29803	-	44070	-	97006	-	
1990	5338	9.0	12632	2.0	5340	-9.0	43588	46.0	44055	-0.3	110953	14.0	
1992	3279	-38.6	11468	-9.2	4714	-11.7	46868	-8.0	40610	-8.0	106939	-4.0	
3. No. of Female Calves													
1988	1814	-	5560	-	2088	-	9290	-	12806	-	31558	-	
1990	2135	17.7	6846	23.0	2128	2.0	11518	24.0	10570	18.0	33197	5.0	
1992	1196	-44.0	4278	-37.5	1692	-20.5	11870	3.0	14663	39.0	33699	2.0	
4. No. of Male Calves													
1988	-	-	-	-	-	-	-	-	-	-	-	-	
1990	1552	-	4845	-	1555	-	10470	-	9043	-	27465	-	
1992	1099	-29.2	4102	-15.3	1227	-21.1	10210	-2.0	12207	34.6	28845	5.0	
5. No. of Heifers													
1988	2828	-	6532	-	3784	-	17753	-	18714	-	49611	-	
1990	3125	10.5	8067	23.5	2640	-30.2	26858	33.9	21768	14.0	62458	20.6	
1992	2632	-15.8	6847	-15.1	2313	-12.4	19033	-29.0	15068	-31.0	45893	-27.0	
6. No. of Breeding Bulls													
1988	341	-	1411	-	318	-	1405	-	971	-	4446	-	
1990	368	8.0	1757	25.0	297	-6.6	2430	73.0	1127	26.0	5979	35.0	
1992	110	-70.1	1357	-22.8	251	-15.5	3224	33.0	2267	-101.1	7209	21.0	
7. No. of other cattle													
1988	-	-	-	-	-	-	-	-	-	-	-	-	
1990	2180	-	5981	-	951	-	18442	-	11629	-	39183	-	
1992	1112	-49.0	7899	-32.1	502	-47.2	20117	9.0	8315	-28.0	37945	3.0	

Source: Ministry of Agriculture Cattle and Milk Production Survey

Table 2: Domestic Fresh Milk Production 1983-1992

Year	Production of Milk (000 Lit)	Annual Percentage Change
1983	12,729	
1984	16,366	28.6
1985	21,821	33.3
1986	23,639	8.3
1987	27,731	17.3
1988	28,799	3.7
1989	31,822	10.5
1990	34,692	9.0
1991	36,400	4.9
1992	39,400	8.2

Source: NDDP Estimates

It has been estimated that the national requirement for fluid milk is about 55 million litres (12 million gallons). Table 2 shows that at the end of 1983 the level of fluid milk production in Guyana was below 13 million litres, representing approximately 25% of the national requirement.

In 1992 domestic production had increased to about 39.4 million litres representing about 71% of the estimated national requirement.

This significant improvement in domestic milk production can, to a great extent, be attributed to the activities of NDDP in improving the quality of herds through their artificial insemination programme and the provision of improved pastures planted with Antelope grass in a number of coastal regions. Technical assistance was received from CARDI and IICA.

2.2.2 Beef Production

Approximately 90 percent of the national cattle population is located in the coastal regions. Cattle production on most of the farms in these regions is a secondary agricultural activity, consequently relatively small amounts of inputs are put into cattle

production. The animals reared are dual purpose animals, used for both milk and beef production. Animals are often slaughtered to provide farmers with quick cash and it is for this reason that farmers often refer to their cattle as a form of savings account. Farmers may also sell some cattle for slaughter during the dry season when existing conditions make it difficult to maintain many animals. About 70 percent of the beef produced in Guyana comes from small cattle farms on the coastland.

There are also a number of medium and large cattle farms that make a significant contribution to beef production in Guyana, for example the Fairfield farm at Mahaicony and LIDCO's (Livestock Development Company Ltd) farms at Mara and Kabawar. On these farms the concept of cattle as a savings account or a fairly liquid asset does not really apply. On the Fairfield farm for example, the dairy and beef herd are held separately. The 'beef' herd is made up mainly of creole and zebu reared for fattening and slaughter. Low producing 'dairy' cows are occasionally culled.

Apart from the farms on the Coastal Regions, LIDCO operates a large ranch at Ebini in the Intermediate Savannah, (Region 10) where over 3,500 heads of cattle are reared primarily for beef production. A considerable number of the calves produced on this farm are sent to the Mara cattle farm on the coast, for fattening. About 5-20% of the beef produced in Guyana comes from LIDCO's farms.

In the past the Rupununi savannah had made a major contribution to national beef production. Presently there exist a number of constraints to cattle production in this region, including cattle rustling, illegal beef trading with neighbouring Brazil, poor communication links with the Coastal Regions, the threat of Foot and Mouth disease and poor quality herds and pastures.

Table 3 shows that the national beef production increased from 1,600 tons in 1985 to 3700 tons in 1992. During the period 1988 to 1990 beef production increased by 40%. The 1990 cattle and milk production survey showed that the national herd increased by 15% for the same period (see **Table 1**). The increase in beef production between 1988 and 1990 would seem to be therefore a function of the increased productivity of the national herd, since the slaughtering of over 45,000 animals did not reduce the total cattle population; in fact the cattle population continued to grow.

Table 6: National Beef Production

Year	Production (000 Tons)	% Annual Increase
1985	1.6	-
1986	1.7	6.3
1987	1.8	5.9
1988	2.0	11.1
1989	2.4	20.0
1990	2.8	16.7
1991	3.0	7.1
1992	3.7	23.3

Source: Ministry of Agriculture, Planning Division

In contrast to this situation, the 23.3% increase in national beef production between 1991-1992 coincided with a 15% decrease in the cattle population. This increase cannot therefore be considered as a positive trend for beef cattle production in Guyana. It was in fact brought about by farmers efforts to concentrate more effort on rice production, as a result of the then favourable market conditions for rice. Many farmers therefore significantly reduced their herd. Death losses due to a suspected bovine rabies outbreak on the Essequibo Coast also contributed to the reduction in the national cattle population during this period.

2.2.3 Marketing and Processing of Milk

Marketing of milk and milk products in Guyana can be considered to be in the very early stages of development. There is no true market infrastructure for the collection, processing and distribution of milk. Quality and sanitary standards are not enforced and there is no diversification in the product market.

The lack of adequate infrastructure in terms of roads, electricity and transportation, has conspired against the development of a distribution network, that would allow for the adequate handling of such a perishable product throughout the distribution chain from the producer to the final consumer.

The result of these constraints in the milk marketing system is evident in the fact that many farmers would only milk a small percentage of their milking cows daily, because of the uncertainty of being able to sell large quantities of milk.

Marginal profitability, in many cases, causes farmers to spend less time and money in cattle production, resulting in a further decline in on-farm productivity.

There are two dairy processing facilities in the country, the Georgetown Milk Plant (GMP) owned by LIDCO and the Versailles Dairy Plant, which belongs to the Guyana Sugar Corporation.

Much of the equipment at Georgetown Milk Plant is more than twenty years old and generally obsolete. The plant has a 330 gal/hr pasteurizer which provides an installed capacity to produce up to 2,000 gallons on every 8 hour work shift. Presently, just about 1,000 gallons of milk is processed daily at this Plant. The milk produced is a mixture of non-fat powdered milk and fresh cow's milk; a peanut punch is also produced.

The Guysuco Dairy Plant is the only facility producing ripened cheese in the country. The Plant was built in 1989 and is equipped with modern Swedish machinery. The Processing Plant is well equipped and managed. The level of hygiene and milk handling is exceptional and well above the normal Guyana standards.

3. SHEEP AND GOAT

3.1 Characteristics of the Sheep and Goat population

The exact size of the sheep and goat population in Guyana is not known. However, FAO Production Statistics Bulletin for 1992, put the number of sheep in Guyana at 120,000 and the goat population at 77,000 heads.

The sheep and goat population is distributed throughout the coastal regions of Guyana. Information from the recently conducted IFAD/IICA Socio Economic Survey¹ of four rural coastal areas showed that the Mahaica-Mahaicony-Abary area has a relatively large concentration of sheep and goats. In fact Region 5, of which the MMA area is a part, may indeed have the largest sheep and goat population in Guyana. The Corentyne area also has a significantly large sheep and goat population.

The Barbados Black Belly is the main breed of sheep found in the coastal regions of Guyana. This breed was probably introduced to Guyana from the Caribbean Island of Barbados and is ideally suited to the environmental conditions of the coastal areas.

Apart from this breed the 'Corentyne White' is also reared in the coastal regions. This sheep is a crossbred with traces of Virgin Island White breed. These animals are sturdier and more muscular than the Barbados Black Belly, providing for a more favourable carcass and dressing weight.

¹ IFAD/IICA (1993/94) Rural Socio-Economic Survey Report.

Sheep and goat production is generally a low input enterprise. The 'Lego' system of grazing is widely used, where animals are allowed to roam at will and feed on the forage available on the sides of canals and roads, harvested paddy fields and communal pastures. Little or no supplementary feed is given.

Animals are often housed in crowded pens, which is in fact more a precaution against larceny than a critical input for improved husbandry.

The low input system of production encourages the easy spread of intestinal parasites. This is a common health care problem among sheep reared in coastal areas. The system of grazing also helps to maintain the cycle of the parasite. Poor housing facilities contributes to the problem of footrot on many farms.

4. SWINE PRODUCTION

4.1 Characteristics of the swine population

Up-to-date information as to the size of the swine population in Guyana is not available. In the absence of such information, reference can be made to FAO's estimates which puts the number at approximately 175,000 heads.

The swine population is well distributed throughout the coastal regions. The coastal areas account for about 80 percent of the swine population.

In the coastal areas there seems to be a pattern of distribution that reveals a close relationship between swine production and the coconut industry. By-products from this industry is often used as a source of pig feed.

The breeds of pigs reared in Guyana are mainly the Large White, Duroc, Landrace, and Hampshire. Other breeds that may be identified are the Wessex, Saddle back, Chester White and the Berkshire.

In most of the coastland areas (East Coast Demerara, Corentyne area, etc.) swine production is a 'back yard' livestock activity and is pursued almost exclusively by the small farmers. A few large farmers practice large scale commercial swine production. On most of the small farms the herd might include 1-3 breeding sows, piglets, gilts, etc. Low cost housing is provided for the animals using undressed wood, scantlings and wood 'end'. Roofs are made mainly of zinc or aluminum but in many cases the roofs are thatched with coconut or other palm leaves.

Housing on the larger commercial farms is quite adequate, with the large majority of pigs being housed in buildings with concrete floors, well ventilated with roofs 8-10 ft high. Pigs are fed and watered in concrete troughs.

For the purpose of feeding, farmers use a wide range of local products and by-products. These include stock feed rice, rice bran, copra meal, wheat middling, molasses, fish meal, shrimp meal, fresh fish, cassava middling and food waste or swill.

Regardless of the potentially wide range of sources of feed, expansion of the swine industry is restricted by the limited supply of some of the important local feed sources. (copra meal, rice bran, wheat middling). Competition with poultry farmers for the available limited feed has further augmented this problem.

5. POULTRY PRODUCTION

During 1992 domestic production of poultry meat picked up again after the substantial fall in production in 1991. Total poultry meat production was 3,034 tonnes in 1992, more than double the production level of the previous year, returning production to the level of the mid 1980's. However, imported chicken still took the greater part of the market, the 4,114 tonnes imported represented about 58% of the market.

Table 7: Poultry Production

	Unit	1990	1991	1992
Domestic Poultry meat	tonnes	2,065	1,404	3,034
Imported chicken	"	781	1,486	4,114
Imported baby chicks	million	-	0.056	0.037
Imported table eggs	"	-	0.77	n/a
Imported hatching eggs	"	-	1.3	1.7
Domestic table eggs	"	13.5	5.3	7.3

Source: Ministry of Agriculture (Planning Division)

The decision by the former government to remove CET tariff on hatching eggs in July 1992 provided some relief to the domestic poultry meat industry.

Egg production also increased in 1992, from 5.3 million eggs in 1991 to 7.3 million in 1992. This is still substantially below previous levels which reached 50 million in the 1980's.

6. THE ROLE OF GOVERNMENT AND NON-GOVERNMENT INSTITUTIONS/ORGANIZATIONS IN LIVESTOCK DEVELOPMENT

National, regional and international organization providing services to the livestock sub-sector are shown in Table 8.

Table 8: Roles performed by selected Institutions

Institutions/ Organizations	Technical Assistance	Research	Production	Marketing	Processing	Animal Health
MOA	✓	✓	✓	-	-	✓
NDDP	✓	-	-	-	-	✓
IICA	✓	-	-	-	-	✓
NARI	-	✓	-	-	-	-
CARDI	✓	✓	-	-	-	-
LIDCO	-	-	✓	✓	✓	-
GUYSIKCO	-	-	✓	✓	✓	-

7. CONSTRAINTS TO LIVESTOCK PRODUCTION IN GUYANA

An analysis of the livestock sub-sector in Guyana would reveal a number of areas where improvement is required in order to foster development within this industry.

Below is a summary of some of the major constraints to livestock production.

7.1 Constraints of Cattle, Sheep and Goat Production

- a) Poor farm management practices;
- b) Disorganized and inefficient marketing system;
- c) Infrastructural deficiencies;
- d) Inadequate support services including extension activities, veterinary service, research and database information collection;
- e) Unavailability of easily accessible credit/loans;
- f) Unavailability of adequate and utilizable land for landless livestock farmers/owners;

7.2 Constraints to Swine and Poultry Production

- a) Insufficient supply of raw materials for animal feed;
- b) The lack of a national breeding programme for swine or poultry;
- c) Inadequate extension service (particularly for swine);
- d) Low farmgate price for pork does not motivate small producers;
- e) The importation of cheap chicken, eggs and pickled pork.

8. CONCLUSION

The livestock sub-sector can make a greater contribution to the economic growth and development of Guyana. The potential regional market for livestock products can be considered as a means of generation of much needed foreign currency for the countries' economic growth. The expansion of this sub-sector would also result in the creation of new job opportunities and enable Guyana to improve its food security position.

These potentials can be realized only within a framework of sound planning, organization and policy. This requires a coordinated effort by all organizations and institutions involved in livestock production, working together to develop a policy framework that would be the basis for developing strategies, plans and programs aimed at systematically eliminating the priority constraints.

THE FISHERIES SUB-SECTOR OF GUYANA

By: T.C. Phillips, Principal Fisheries Officer,
Ministry of Agriculture

1. BACKGROUND

1.1 Fisheries and the National Economy

The Agriculture, Forestry and Fisheries Sector is of critical importance to Guyana in the key area of its economy. The contribution of this Sector to the Gross Domestic Product (GDP) in 1992 was G\$16,401 million (40.6%), with the Fisheries Sub-sector contributing G\$3,132 million (7.76%). The Fisheries Sub-sector contribution (1992) to the Agriculture, Forestry and Fishery Sector portion of the GDP was 19.1% (Bureau of Statistics, 1993).

The Agriculture, Forestry and Fisheries Sector for the same period accounted for G\$24,238 million (60.2%) of the total domestic export earnings, with the contribution of the Fisheries Sub-sector being G\$2,788 million (6.92%). The Fisheries Sub-sector contribution in 1992 to this Sector's portion of the total domestic export earnings was 11.5% (Bureau of Statistics, 1993).

1.2 Characteristics of the Fisheries Sub-sector in 1992

Current production (1992) of the Fisheries Sub-sector was estimated at 44,034 mt of which the Industrial Fishery landed 7,308 mt, Artisanal Fishery landed 35,926 mt and the Inland Fishery, including Aquaculture, landed 800 mt. The gross value of fisheries output was estimated at G\$5,664 million (Table 1).

Exports of prawns, seabob and whitebelly shrimp, and fin-fish and by-products amounted to 9,470 mt liveweight. The value of these exports were estimated at G\$2,788 million.

Most of the fish landed was consumed locally. This pattern of consumption has not changed significantly over the last ten years.

Table 1: Characteristics of the Fisheries Sub-sector in 1992

Item	Production Liveweight (mt)	Imports Liveweight (mt)	Exports Liveweight (mt)	Total Supply (mt)	Per capita supply kg/year
Marine Fisheries:					
- Industrial:	7,308				
- Artisanal:	35,926				
Inland Fisheries, (Including Aquaculture)	800				
Total	44,034	na	9,470	34,564	45.56
Estimated Employment:					
- Primary Sector:	6,000				
- Secondary Sector:	4,000				
Size of the Fleet:					
- Industrial:	108				
- Artisanal:	1,300				
Gross value Fisheries output (at ex-vessel prices):	G\$5,664 million				
Trade:					
- Value of Imports:	na				
- Value of Exports:	G\$2,788 million				

2. Fisheries Management and Development Plan

In view of the fact that Fisheries is seen as part of the Agriculture Sector, any plan for its development should adhere to, as clearly as is possible, the national policies and objectives that provide the direction for agriculture development in Guyana.

The Draft Agriculture Development Plan 1987-1990 (in which Fisheries was identified as one of the Sub-sectors) outlined the objectives, strategies and global targets for agriculture development. It was against this background that a Fisheries Management and Development Plan 1989-1993 was drafted in 1988 by the Fisheries Department. This plan serves as one of the base documents in the soon to be implemented (possibly in September) 1993, Government of Guyana (GOG)/Canadian International Development Agency (CIDA) - Fisheries Technical Assistance Project (FTAP). The following outputs are expected from FTAP over a one year period:

- a) preparation of a Fisheries Background Report;
- b) preparation of a Fisheries Management and Development Plan;
- c) formulation of Developmental Investment Projects; and
- d) training of Fisheries Department Counterpart personnel.

3. FISHERIES SUB-SECTOR

3.1 Fisheries Legislation

The management, regulation and promotion of the exploitation of Guyana's fishery resources is done within the existing legal framework of the Fisheries Act 1957 and the Maritime Boundaries Act 1977.

In 1985, influenced by the outcome of the Third United Nations Law of the Sea Conference and the resulting Convention (as well as by the need to bring Guyana's fisheries laws and regulations up to date so as to facilitate enhanced management and development of the resources), the FAO was approached to provide technical assistance in the form of a legal consultant to draft new fisheries legislation.

This assistance was provided and a draft set of legislation was put forward covering such areas as:

- a) fisheries Management and Development;
- b) fisheries Advisory Committee;
- c) regional Cooperation in Fisheries;
- d) fisheries Access Agreements;
- e) foreign and Local Fishing Licences;
- f) fisheries Research;
- g) ornamental Fish Export Fishery, and
- h) aquaculture.

The Draft was finalised by the Attorney General's Chambers and the Fisheries Department but some time has elapsed without it being placed before Parliament for approval. As such, the Fisheries Department, with agreement from the Attorney General's Chambers, is pursuing an offer from FAO to review and revise the draft legislation based on that Organisation's more recent experiences in drafting legislation for other countries and in monitoring the application of the laws and regulations in these countries. The revised draft legislation will then be put forward for approval and subsequent application in the Fisheries Sub-sector.

3.2 Components of the Fisheries Sub-sector

The Fisheries Sub-sector of Guyana is made up of three primary components, with further subdivisions as follows:

- a) **Marine Fishery:**
 - Offshore Industrial/Trawl Fishery
 - Inshore Small-Scale/Artisanal Fishery
- b) **Inland Fishery:**
 - Subsistence Fishery (for food)
 - Ornamental Fish Export Fishery
- c) **Aquaculture:**
 - Brackish-water Culture
 - Fresh-water Culture

3.3 Marine Fishery

3.3.1 Fishery Zone (FZ)

The Maritime Boundaries Act 1977 established a Fishery Zone beyond and adjacent to the Territorial Sea (12 miles) and bounded on its seaward side by the line, every point on which is two hundred (200) miles from the nearest point of the baseline of the Territorial Sea (Figure 1). On the 23rd February, 1991 this Zone became recognised as an Exclusive Economic Zone (EEZ) when the President of Guyana promulgated an order known as the Exclusive Economic Zone (Designation of Area) Order 1991, acting under the provisions of Section 15 of the Maritime Boundaries Act, 1977. However, it should be noted that the legal regime in force still relates to the Fishery Zone.

Guyana has a coastline of 270 miles (432 km) and a continental shelf area of approximately 14,850 square miles (38,016 km²). The average width of the continental shelf is 55 miles (88 km). The area of the FZ is 54,000 square miles (138,240 km²).

Presently, the living resources being exploited within the FZ are mainly the demersal fishery resource and to a limited extent the pelagic fishery resource over the continental shelf and towards the continental slope.

3.3.2 Marine Fishery Resource

The marine fishery resources of Guyana can be grouped into two broad categories, namely the demersal resource and the pelagic resource. The demersal resource is comprised of bottom dwelling fin-fish and crustaceans, mainly shrimp. Various estimates of the magnitude of the standing stock and potential yields from these resources have been attempted. Table 2 provides some of these estimates on potential yields.

FIGURE 1 - TERRITORIAL SEA AND FISHERY ZONE

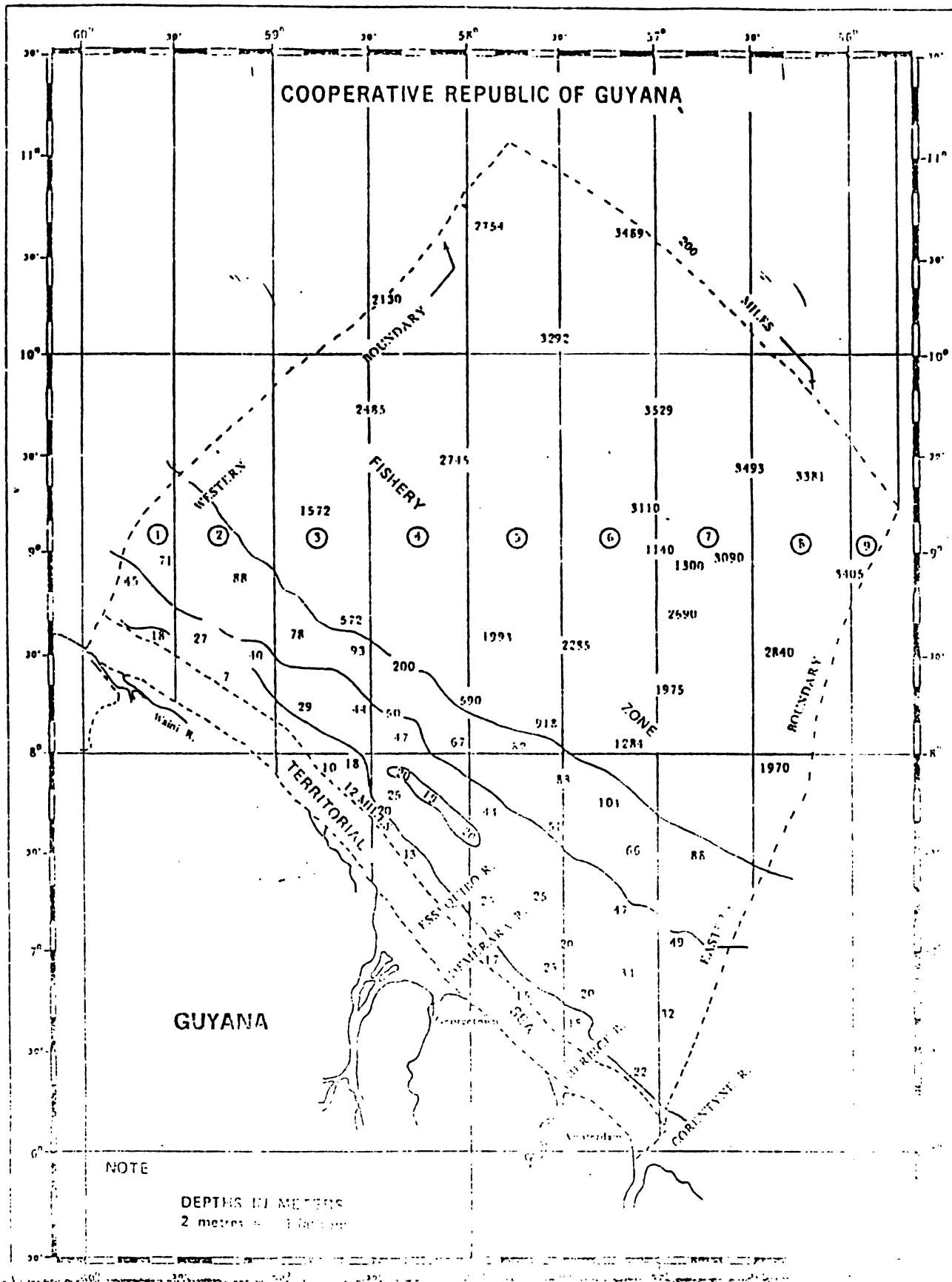


Table 2: Summary of Marine Resource: Estimated Annual Potential Maximum Sustainable Yield (Mt)

Survey of Scientist					
TYPE	Gulland (1971)	Jones and Dragovich (1975)	Klima (1976)	FAO/NORAD Survey (1988)	Amount used for Planning
Demerara Fin-fish	45,000	-	75,000	45,000	65,000
Snappers and Groupers	-	-	1,500	-	1,500
Shrimp:					
Prawn	-	3,800	-	-	3,750
Seabob	-	-		-	-
White - belly	-	-		-	-
Pelagic Fin-fish	65,000	75,000	-	-	65,000
Squid	-	2,000	-	-	-

Source: Charles, 1990.

3.3.3 Offshore Industrial/Trawl Fishery

The Offshore Industrial/Trawl Fishery consists of 108 trawlers, four licenced fish/shrimp processing plants (Georgetown Seafoods and Trading Co. Ltd. (GS&TC); Marine Food Products Ltd. (MFPL); BEV Enterprises, and Noble House Seafoods (NHS)) and numerous wharves and dry docking facilities. Ice and freezing facilities servicing this Fishery are owned and operated by participants within and outside of the Fisheries Sub-sector. The trawlers are 53 percent foreign owned (GS&TC Ltd. and Nisshin Suisan KK). Foreign trawlers mainly exploit prawns (*Penaeus* species) with fin-fish as by-catch while locally owned trawlers mainly exploit a smaller shrimp called seabob (*Xiphopenaeus kroyeri*) and fin-fish. These trawlers measure about 21 metres in length and use double outrigger shrimp trawls.

3.3.4 Inshore Small-scale/Artisanal Fishery

The Inshore Small-scale/Artisanal Fishery consists of approximately 1300 vessels ranging in size from 6 to 18 meters propelled by sails, outboard or inboard engines and using gear that include chinese seine (fyke net), pin seine (beach seine), cadell lines and handlines, drift seine and circle seine (modified gill nets). The larger vessels have ice boxes and go on fishing trips that last as long as 18 days, while smaller vessels have no ice boxes and their operations are either tidal or diurnal. Except for the large handliners and drift seiners which may or may not be decked, most artisanal vessels are flat-bottomed dory type with little draft which affords great maneuverability over shallow muddy and sandy bottoms (Figure 2).

There are about 4,500 small-scale fishermen. Of these about 1,000 are boat owners. Sixty to seventy (60-70) percent of the boat owners are members of Fishermen's Cooperative Societies (13 in all) which acquire and sell fishing requisites to their members.

At present, the development of onshore infrastructure facilities (wharves, ramps, workshops, fuel depots, requisite shops, ice machines and storage bins, and fish storage bins) at eight sites along the coast for this Fishery is being financed by Government, with assistance from CIDA and the EEC. On completion, each complex is leased to the Fishermen's Cooperative Society within whose boundaries it falls, for management and operations.

3.3.5 Management of the Marine Fishery

3.3.5.1 General Principles and Objectives

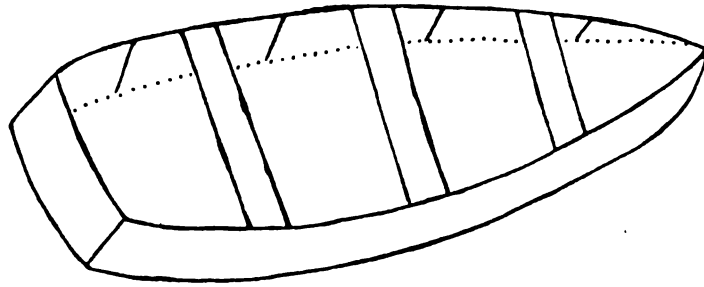
In 1992 the Fisheries Department with assistance from the CARICOM Fisheries Resource Assessment and Management Programme (CFRAMP) prepared a Draft Marine Fishery Management Plan for Guyana (Phillips, Mahon and Aiken, 1992). This Management Plan is the second step toward the establishment of a national fishery management plan following the initiatives set out in the Draft Fisheries Management and Development Plan 1989-1993.

This plan follows from, and seeks to be consistent with, the UNCLOS III (United Nations, 1982). In particular, the following interpretations of UNCLOS III are directly relevant to the development of management plans (FAO, 1986).

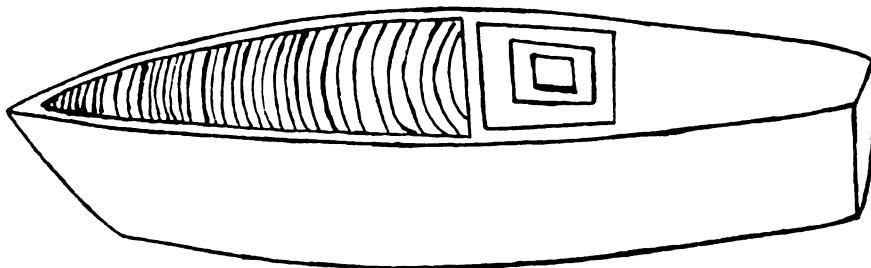
"The Convention of the Law of the Sea gives coastal States sovereign rights over the resources of the exclusive economic zone (article 56), [...and...] it is the sole prerogative of the coastal State both to determine the allowable catch of the living resource in the EEZ (article 61), and to determine its own capacity to harvest those resources (article 62)." "One of the main duties of the coastal State is to ensure that 'the maintenance of the living resources in the exclusive economic zone is not endangered by overexploitation'. Towards that end the coastal State has to adopt proper conservation and management measures (article 61).

FIGURE 2

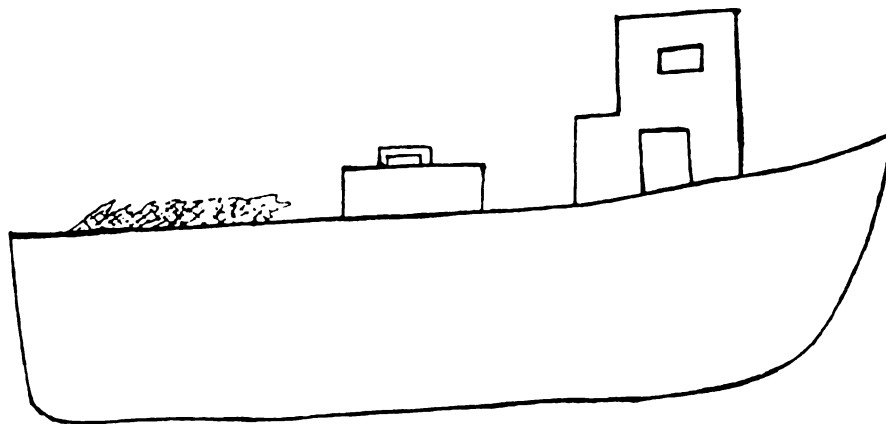
TYPICAL ARTISANAL BOATS



UNDER 8 m LONG



8 TO 11 m LONG



OVER 11 m LONG

"Where the coastal State does not have the capacity to harvest the entire allowable catch, it has the duty to give other States access to the surplus of the allowable catch."

"The Convention provides for States to take measures in order to co-ordinate and ensure the conservation and development of stocks where 'the same stock or stocks of associated species occur within the exclusive economic zones of two or more coastal States'. [...] States may utilise appropriate subregional or regional organizations in seeking to agree upon measures to be taken."

"The coastal State and other States whose nationals fish for highly migratory species both within and beyond the exclusive economic zone are under a duty to co-operate to ensure conservation and promote the objective of optimum utilisation of such species."

The above provisions, and the management options presented in this document, are based on the conclusion that it is necessary to actively manage fishery resources. This in turn is based on the assumption that an open access resource will eventually become overexploited. Thus it follows that for optimal long-term utilization, fisheries will require regulation and should be regulated provided that returns (not necessarily only economic) justify expenditures.

3.3.5.2 Basic Principles or Standards

The fishery management options set out in the Plan have been informed by the following principles, which can be said to be fundamental to fisheries management or a fisheries management plan:

- a) Conservation measures should ensure the survival of the species and, as closely as possible, maintain the resource and its environment in a condition that allows the optimal economic yield to be taken.
- b) Conservation and management measures should be based on the best scientific information available.
- c) Information on all aspects of the plan may not initially be equally good, scientifically speaking. This should not prevent the best evaluation being arrived at as to the kind of measures that need to be taken to preserve the fishery from dangerous future trends. Such "preventative measures" are likely to provide time for a proper investigation to be made.
- d) Following from (c) the management plans should be regarded as continually evolving, by a process of research and consultation, in such a way that its provisions are being continually perfected. This, however, means that new provisions should be introduced only after careful consideration.

- e) To the extent possible, management measures on a resource or closely inter-related resources should be coordinated over its whole range.

This should include some method of consultation on fishery policy for resources extending into other (national, regional) jurisdictions.

- f) The management plan should allow for natural variations in abundance and value of the resource.

Several other elements should be included here, which may be given different degrees of priority, depending on governmental policy and political philosophy and which may not all be fully achievable simultaneously, namely:

- g) the fishery plan shall promote efficiency in the utilisation of fishery resources, within the constraint that major adverse effects on fishermen should be minimised or avoided;
- h) the fishery plan shall give priority to those fishermen now gaining a major part of their livelihood from fishing the resource in question, and take into consideration the traditional approaches to fishing, as long as these are not harmful to the resources;
- i) conservation measures shall, where possible, avoid duplication and adverse impact on other marine resources and their users (and, of course, vice versa).

The strategy for fisheries management in the FZ would be to take, based on existing information on the marine resources, management decisions that would be operative in the short term, while undertaking resource surveys to better inform the future management and development process.

3.3.5.3 The Objectives of Management

The Draft Agriculture Development Plan 1987-1990, outlined the general objectives, strategies and global targets for the sector. It was against this background that the major objectives of fisheries management were outlined as follows:

- a) To achieve nutritional self-sufficiency and food security.
- b) To maintain in good working order and obtain the optimal utilisation of assets related to production.
- c) To generate employment and increase incomes in the sub-sector.

- d) To increase net foreign exchange earnings.
- e) To obtain a rapid increase in aggregate output and productivity to significantly impact on the growth of the national economy.
- f) To promote the image of fishing as an occupation that is socially desirable and financially rewarding.
- g) To incorporate into the national consciousness, an awareness of the need to apply appropriate technology to the fisheries production process.

3.3.5.4 The Fishery Management Planning Process

Fishery management planning involves a number of initial phases, then it becomes an iterative process in which the plans are reviewed on a regular basis and revised according to changing circumstances to reflect new information. The process is depicted in Table 3.

Table 3: The Fishery Management Planning Process

Activities	Outputs
Preparation of Draft Fishery Management Options by the Fisheries Department.	Draft Fishery Management Options Document.
Review by participating Agencies/ Cooperatives in the Fisheries Sub-sector.	Draft Fishery Management Plans from selected options.
Review by Fisheries Advisory Committee (FAC).	Draft Fishery Management Plans with modifications and recommendations.
Review by Minister responsible for Fisheries.	Final Draft Fisheries Management Plan.
Final Draft Fisheries Management Plan submitted to Cabinet for approval.	Fisheries Management Plan (FMP) approved.
Regular review of Fisheries Management Plan by FAC as more information on resources becomes available.	Amendments to the FMP, if necessary, after process of consultation repeated.

Source: Phillips, Mahon and Aiken, 1992.

3.3.5.5 Marine Fishery Management - Problems and Management Options

Within the recently prepared Draft Marine Fishery Management Plan for Guyana, plans were outlined for the following Fisheries:

- a) Offshore Industrial/Trawl Fishery
- b) Inshore Small-scale/Artisanal Fishery [covering pin seine, chinese seine, cadell, gillnet (nylon and polyethylene) and circle seine, with sharks and mackerels being separated out into sub-groups].
- c) Snapper/Grouper Fishery
- d) Large Pelagic Fishery
- e) Small Pelagic Fishery.

a) Offshore Industrial/Trawl Fishery

Trawlers catching prawns operate in areas ranging from 40 to 145 km from the shoreline over the continental shelf, with depths ranging from 18 to 91 m. Those catching seabob operate in areas ranging from 15 to 30 km from the shore over the continental shelf, in depths ranging from 13 to 18 m. The bottom of the seabed tends to be mud, gravel or sand.

These trawlers take on board fin-fish as by-catch, with the prawns trawlers being required to land 15 mt of by-catch each year. Some local trawlers target fin-fish when prawns and seabob are not in abundance. Species such as bangamary, butterfish, sea trout and croaker are caught as by-catch or catch.

The prawn resource is either being fished at its optimum sustainable yield or above. The seabob which were relatively underexploited (mainly by the chinese seine operators) in the past are now being more fully exploited (by chinese seine operators and local trawler operators) with the advent of a number of seabob processing plants (BEV and NHS). Until more is known about the seabob resources some caution should be exercised in terms of fleet expansion.

The state of the fin-fish resource taken as by-catch or by directed trawling would have to be determined in relation to the activities of the Inshore Artisanal Fishery and the Snapper/Grouper Fishery.

Besides the above-mentioned resource problems, other problems such as conflicts between industrial and artisanal operators at sea due to entanglement of gear; over the side sales at sea, and poaching by foreign vessels will have to be addressed. Dumping of by-catch at sea, especially small and juvenile fish continues to be a problem despite some limited initiatives to land by-catch. Also, the reduction of turtles as incidental catch in trawls would have to be addressed if Guyana is to maintain access to the U.S.A market.

The management objective for prawns would be to stabilise the landings/production, whereas that for seabob and fin-fish would be to increase production bearing in mind the need to develop and maintain sustainable fishing operations. In the case of prawns and seabob the Fishery is mainly export oriented (foreign exchange) while most of the fin-fish is consumed locally.

The seabob and demersal fin-fish operations should be reserved for Guyanese. In the case of prawns, where presently foreign participation is dominant, with any resulting pull-out by a company or an individual from the limited entry fleet, the preference for replacement should go to a Guyanese company or individual.

In the case of prawns the management strategy would be to effectively manage the exploitation of the resource while seeking to rationalise and optimise on the use of the equipment in the Fishery.

In the short term, the limited entry licenced fleet approach should be maintained, with a review of the existing information being done to determine whether the upper limit of 100 vessels should be changed. Consideration should be given to prohibiting trawling for prawns from 18 fathoms shoreward. The issue of the closed season should be revisited and if found to be necessary implemented. Regulations should be enacted to make the use of turtle excluding devices (TEDs) on all trawlers compulsory.

The present monitoring system of vessel logbooks and plant logbooks should be improved upon and fully implemented to provide accurate information on catch, effort and size categories. This information would be used in making future management decisions for the exploitation of the prawn resource.

Recognising the management unit for prawns as being the shared stocks among the countries of the Guianas-Brazil shelf, Guyana should seek to fully participate in the activities of the proposed FAO-WECAFC SAC (FAO - Western and Central Atlantic Fisheries Commission Scientific and Advisory Committee for the Management of the Shrimp Fisheries of the Guyana-Brazil Management Area) on shrimp.

Later, more complex methods of management such as fleet quotas and transferrable quotas which would allow more economically efficient use of the resource could be addressed. Also, the establishment of a regional mechanism for management of the resource could be undertaken by the countries sharing the resource.

As with prawns, the present monitoring system of vessel and plant logbooks should be improved upon to provide accurate information for the making of management decisions for the exploitation of the seabob resource.

In the short term, the limited entry licenced fleet approach should be maintained, with a review of the existing data being done to determine if the upper limit (33 trawlers) should be changed. Consideration should be given to limiting the number of plants licenced to process seabob in order to optimise on the use of existing plant capacity as well as to reduce the pressure for more fishing effort.

A study should be undertaken to determine the areas of high adult abundance and the level of seasonality of the seabob resource. This would be with a view to reducing conflicts with artisanal fishermen and damage to nursery areas and juveniles. Also, it would help to determine whether a closed season was needed.

Later, more complex methods of management such as fleet quotas, etc. may be addressed as the seabob fishery becomes more developed.

In the case of directed trawling for demersal fin-fish a limited entry fleet approach should be taken after reviewing existing data in relation to the exploitation of the demersal fin-fish resource.

The introduction of mesh size regulations and the appropriate fin-fishing trawls should be addressed. Also, the restriction of trawling with a view to reducing conflicts with artisanal fishermen and damage to nursery areas and juveniles should be looked into.

The problems associated with the by-catch should to some extent be addressed when the reviews on the fleet limits of the prawns and seabob fleets are undertaken, especially if they result in a lowering of the upper limits of one or both of these fleets. Also, the feasibility of using fin-fish excluding devices could be looked at, but the effects of such devices in terms of a reduced protein supply would have to be considered as well.

Later, bearing in mind the complex situation as it relates to the exploitation of the demersal fin-fish resource, it may become necessary to impose closed seasons and/or apply more complex methods of management. Also, the proposed FAO-WECAFC SAC could be broadened to include demersal fin-fish fisheries (not just by-catch) in the management area.

An economic study of the Offshore Industrial/Trawl Fishery should be undertaken to facilitate the establishment of an economic data base for use in bio-economic models (such as those being developed by the FAO); the determination of suitable licence fees; and the review of existing levies.

An attempt to conduct a Cost of Production Survey, which would have provided some baseline data on the cost of production for prawns, seabob and fin-fish (caught by trawlers) in the Offshore Industrial Fishery, by the Fisheries Department and Agriculture Planning Unit of the Ministry of Agriculture and the State Planning Secretariat in 1992 met with very little success (no questionnaires have been returned to date). The Survey was devised, following strong representation by trawler operators and processing companies. Its purpose was to determine to what extent falling prawns production and reduced prices for prawns, due to recession and the in-roads by aquaculture prawns, along with the tax on fuel and the export levies on shrimp and fish, were affecting the viability of the companies operating in this Fishery. It was also to assess the impact of any corrective measures on the resource management regime and revenues coming to the State from the Fishery. Such a Survey would still appear to be necessary despite any temporary relief measures which are likely to be granted to the companies in the Fishery.

b) Inshore Small-scale/Artisanal Fishery

Pin seines or beach seines are 2m high and up to 2,000 m in length with a stretched mesh size of 9 cm or less. The net is set up at high tide in the intertidal zone. During the ebbing of the tide fish are trapped then retrieved from the mud flats by operators using small boats or catamarangs. The catch includes mullet, queriman, snook, bangamary, croaker and catfishes. There are over 50 pin seine operations.

Chinese seines are funnel shaped nets 16 m long and 4-6 m wide at the mouth end. Their mesh size gradually tapers from the mouth end (8 cm) toward the bag end (1 cm). The net is attached to poles and set on mud banks along the coast, in rivers and particularly in river mouths. Fish and shrimp are swept into the bag of the net by tidal currents. Each boat operates between one and ten nets. The catch is normally made up of whitebelly shrimp, seabob, bangamary, butterfish and catfishes. An undetermined amount of immature fish is caught and in most cases discarded. Over 400 vessels are involved in chinese seine fishing.

Cadell or demersal longline fishing is done with a ground line anchored at each end. A series of gangling lines carrying baited hooks are attached to the longline at regular intervals, about 2 m apart. Each cadell line is about 1.6 km long and usually has 800 hooks. The lines are baited before each trip and taken out to the fishing ground in trays. Cadell catches consists mainly of gillbacker, cuirass, other catfishes and sharks. Over 120 vessels are involved in cadell fishing.

Gillnets (polyethylene) vary in length from 1,000 to 1,600 m and are 4 m deep with a stretched mesh size of 20 cm. Nets are set and hauled manually from the boats. The catch consists mainly of gray snapper, sea trout, cuffum, gillbacker, mackerel and sharks (Chakalall and Dragovich, 1979). Some 400 vessels are involved in gillnet fishing.

Modified versions of the gillnet, approximately 300 m in length, made of nylon and with smaller mesh sizes (8 cm) are being used by some operators in the near shore areas to catch mainly catfishes, but younger stages of gray snapper and sea trout are being caught. Immature fish are discarded. About 200 vessels are involved in gillnet (nylon) fishing.

Another version of the gillnet made of nylon and called a circle seine is used in the Corentyne River in Berbice. The average length of the seine is 300 m. The catch consists of laulau, silver bashaw and highwater. About 8 vessels are involved in circle seine fishing.

Activity in the Inshore Artisanal Fishery is pursued exclusively by Guyanese operators. This approach should be maintained bearing in mind the traditional nature of these operations and the Guyanese mastery of the technologies involved; the relatively low level of investment required to set up a fishing operation in this Fishery and the already considerable level of State investment in onshore infrastructure to facilitate artisanal fishery development.

Taking into account the estimated annual potential yield for demersal fin-fish (65,000 mt) and the estimated landings from this Fishery of 34,000 mt, there is scope for expansion. The effects of the Trawl Fishery on the demersal fin-fish stocks in regard to by-catch (resulting from shrimping and fin-fish as a result of direct fishing) would have to be taken into consideration when looking at expansion. In like manner the effects of trawling for seabob would have some bearing on seabob and whitebelly shrimp available to the chinese seine operators and vice versa.

Besides the above stated resource considerations, there are other problems that would have to be addressed such as the damage done to the resource by such gears as the pin seine, chinese seine and nearshore nylon gillnet by way of destruction of juvenile fish. The likely social and economic consequences of the elimination and/or reduction of these gear types should not be over looked.

In view of the nature of the shark resources which can lead rapidly to overexploitation, the apparent development of a shark fishery should be examined to determine whether to encourage this fishery and if so to determine the approach to be taken.

The relationship between mackerel (presently being caught as incidental catch by gillnet vessels but for which a demand is developing) and the Inshore Artisanal Fishery should be examined as it relates to the resource potential and the removal of the resource.

The management objective would be to increase the artisanal landings by about 20% which would enable the Fishery to contribute to improved nutrition for the population, export earnings, increased employment and incomes.

The strategy would be to initiate management actions in the short term that would lead to rationalisation in the development of the artisanal fleet so as to more effectively exploit the resources while seeking to effectively utilise the onshore infrastructure and equipment in place. The provision of fishing requisites would also be a vital part of this process. Some consideration may have to be given to subsidising the apparent high cost of landing fish as at present the fishermen are finding the prices being offered by the processors/exporters to be more attractive to them and this could eventually affect the direct contribution of the Fishery to the protein requirements of the population.

The approach to the management of the Inshore Artisanal Fishery which is targeting mainly the demersal resource would have to take into consideration the effect of this management strategy on the activities of the other Fisheries, e.g. Snapper/Grouper and Trawl Fisheries, so as to develop an integrated approach to the management and development of the marine fishery resources.

At present an open access situation exists although in keeping with the Fisheries Act 1958 all fishing vessels have to be registered and licenced. Pin seine regulations exist for the placement of one pin seine in relation to another in a beach area. Also, chinese seine operators are required to have fish pen permits.

In the short term, the present data collection system utilising vessel logbooks to monitor basic catch, effort and species composition should be improved upon by the inclusion of trip interviews at selected landing sites determined after a complete census of the Inshore Artisanal Fishery (Draft Fisheries Data Collection System for Guyana, 1992). The resulting information would be used in making future management decisions for the Inshore Artisanal Fishery.

A study of pin seine operations should be undertaken to determine whether available beach space affected by the erosion and accretion cycle along the coast and the seasonality of the operations apply sufficient limitations in terms of the management of the Fishery. Regulation of mesh size and length of seine should be looked at.

Later, limitations by way of licences or elimination of the gear can be considered depending on the outcome of the study and analysis of the data generated by the data collection system.

The chinese seine is the only known means in Guyana of harvesting the whitebelly shrimp. Thus, in addition to the likely social and economic aspects there would appear to be some need for the use of the gear.

Regulations should be put in place limiting the number of licences to those already in the Fishery. Limits on the number of seines per vessel should be considered.

A socio-economic study of the communities where chinese seine operations predominate should be done to determine the likely consequences of further restrictions or elimination of this gear.

Later, by means of investigations, the areas of high shrimp concentrations could be identified and mapped as well as the seasons determined. Operations could then be restricted to these locations and seasons of abundance.

Cadell operations could be encouraged but hook size regulations should be looked into as a means of ensuring only larger sizes of species are targeted.

Later, restrictions on the number of hooks per tray and number of trays per vessel could be addressed. Regulations on the size of fleet by way of licences could be put in place.

In terms of the nearshore nylon gillnet operations, a study of the Fishery should be done and if found to be necessary then regulations on mesh size and length of seine could be put in place. Later, if thought to be necessary, the number of licences could be restricted.

The polyethylene gillnet because of likely good economic returns has been identified as the gear type to be encouraged, but regulations on mesh size should be addressed as a means of conserving the resource. Later, limitations on effort (e.g. fleet size) should be addressed.

The shark resource should be carefully examined as it is likely to be overexploited by a lower level of effort than the overall inshore assemblage. Targeting may therefore overexploit shark, but separating shark and other inshore fishing may not be possible as the gears being used are gillnet and cadell, common to some other species. It may therefore be necessary to reduce targeting of shark by imposing limits on the proportion of landed catch or by limiting by licences the number of processing plants utilising sharks.

In view of the apparent increasing demand for mackerel for export it may become a targeted species and as such should be monitored.

In the short term, systems must be put in place to gather data on catch, effort, species composition and the sizes of the fish in the catch to determine the value of the Inshore Artisanal Fishery and to determine mechanisms for effective management.

In the longer term, management will have to take into account the multi-species multi-gear nature of the Fishery where management measures must apply across all gears.

c) Snapper/Grouper - Deep Slope Fishery

Fishing boats known as handliners, measuring up to 18 m in length and fishing at depths between 120 m and near the edge of the continental shelf (slope) target snapper and grouper. Each vessel is normally equipped with eight polyethylene handlines, each line carrying 16 hooks (Chakalall and Dragovich, 1979). About 5 vessels are involved in snapper/grouper fishing.

There is room for limited expansion in this Fishery bearing in mind the estimated annual potential yield of 1500 mt (Table 2).

The management objective for this Fishery would be to optimise production for the export markets which offer good prices, especially for fresh snapper or snapper on ice. Some of the production could also go to the developing tourist market. Because of the inefficient nature of present operators, the direction that the Fishery would be encouraged to take would be one of suitable sized vessels outfitted with electric snapper reels or hydraulically powered longline haulers. This indicates some level of technology transfer which may require permission being granted to a limited number of foreign vessels with the appropriate technology.

Besides the need to carefully manage the exploitation of the resource, there is also the issue of poaching by foreign vessels in the snapper/grouper areas which would have to be resolved if efforts to manage and develop the resource are to succeed.

Currently, vessels are registered in keeping with the Fisheries Act 1958.

In the short term, monitoring systems for catch and effort data as well as for length frequency samples should be established. Also, economic data should be collected. A limited licence entry fleet approach should be taken until further data is gathered.

Later, resource assessment activities should be undertaken with the aim of providing more accurate estimates of potential yield. Hook size regulations should be considered in the elimination of the catching of undersized fish. Also, bio-economic modelling may be attempted using the bio-economic data coming out from the data collection system.

d) Large Pelagic Fishery and Small Pelagic Fishery

The Large Pelagic Fishery and the Small Pelagic Fishery represent new areas for which at present there is scant information. The former Fishery could be developed in terms of the export potential of the species involved (tunas and tuna-like species) while the latter Fishery could be developed in terms of the potential use of the species (clupeids, anchovies, and carangids) involved in canning for export and/or as fish meal in the feed industry.

There should be cautious exploratory approaches to these Fisheries aimed at determining stock size and distribution and from the data, respective fleet sizes, gear and seasonality. A monitoring system to collect data on catch, effort, species composition, and length frequencies would have to be put in place. Economic data should also be collected.

Exploratory fishing may be encouraged by way of a foreign/local joint venture or a foreign exploratory fishing agreement for one to two years recognising the need to obtain information on the resource as well as to access and foster the transfer of harvest and post harvest technologies.

e) Environmental Considerations

Degradation of coastal habitats (mangroves and other wetlands) which are known to serve as nursery areas for many of the species harvested in the Offshore Trawl Fishery, Inshore Artisanal Fishery and the Snapper/Grouper Fishery can be expected to impact negatively on the yields of these Fisheries. The interaction with coastal aquaculture (brackishwater culture) both in terms of the destruction of the wetland areas and the collection of eggs, fry and juveniles from the sea for culturing would also have to be carefully monitored and controlled as these activities can have adverse effects on these Fisheries.

The approach to ensuring adequate conservation of these habitats should be an integrated one in keeping with the concepts of coastal zone management. As such the links with the inter-agency Committee on the Environment of GAHEF and its Sub-Committee on Coastal Zone Management on which the Fisheries Department is represented should be strengthened. The Sub-Committee should play a more vibrant role in promoting coastal zone management and in monitoring coastal zone activities.

f) CARICOM Fishery Resource Assessment and Management Programme (CFRAMP)

CFRAMP is a CIDA and CARICOM states funded Programme which will be implemented over an eight year period, starting 1991. Its goal is to promote the management and conservation of the fishery resources of CARICOM countries and to permit exploitation of these on the basis of sustainable yield. The purpose is to enhance the basic information and institutional capacity necessary to manage and develop fishery resources in the CARICOM region.

The Programme is made up of three Projects with each having a number of Subprojects as follows:

- a) **Fishery Management Systems Project:**
 - Fisheries Management Plans
 - Fisheries Data and Information Systems
 - Community Participation/Education
 - Licencing and Registration Mechanisms
 - National Advisory and Decision Making Mechanism
 - Fishery Management Mechanisms

- b) **Resource Assessment Project:**
 - Lobster
 - Shallow-Reef Fishes
 - Large Pelagic Fishes
 - Flyingfish
 - Conch
 - Deep-Slope Fishes
 - Coastal Pelagic Fishes
 - Shrimp and Groundfish

- c) **Training Project:**
 - Formal Academic Training
 - Short-Term Attachments
 - Short Courses.

Under Project (a) Guyana prepared in October and November, 1992 a Draft Marine Fishery Management Plan for Guyana. This now needs to be taken through the Fishery Management Planning Process (Table 3) in order to finalise it for implementation.

A Draft Fishery Data Collection System for Guyana for the Offshore Trawl Fishery, Inshore Artisanal Fishery and the Snapper/Grouper Fishery has been prepared and is soon to be implemented with assistance from CFRAMP. The Licence and Registration System is being tested.

Guyana intends to participate in Project (b). Subprojects on Large Pelagic Fishes, Deep-Slope Fishes, Coastal (Small) Pelagic Fishes and Shrimp and Groundfish (Demersal Fish) will provide access to some of the resource assessment data referred to in Section a.

Active participation in CFRAMP will assist in putting systems in place, which, if properly manned and maintained, would provide information for short, medium and long term resource management decisions that would permit exploitation of the pelagic and demersal resources on a sustainable basis.

3.3.6 Surveillance and Enforcement

At present, in the inshore and offshore fishing areas of Guyana's FZ, the following problems exist:

- a) Under 50% of the artisanal fleet is licenced each year. The Coast Guard (Guyana Defence Force), the Guyana Police Force and the Fisheries Department, who by law are responsible for fisheries surveillance and enforcement of the FZ, are unable to carry out effective patrolling, etc. of the Zone. Trawler operators go way beyond the February 28 deadline for re-licencing of vessels for similar reasons.
- b) Frequent conflicts between artisanal fishing operations and trawling operations. These are due to lack of enforcement of fishing regulations because of the absence of the Coast Guard in the FZ.
- c) Illegal transshipments of shrimp, especially prawns, and fish at sea, which result in serious losses to legitimate operators due to the lack of enforcement capability by the Coast Guard and other agencies.
- d) Illegal fishing by foreign vessels.

The Coast Guard's (being the primary force in this instance) inability to effectively carry out surveillance and enforcement over the continental shelf will be further aggravated with the implementation of the Marine Fishery Management Plan and will be still further compounded should Guyana enter into any access agreements with regards to the exploitation of the deep-slope and off the shelf pelagic resources.

The Coast Guard as it presently exists would appear to lack the resources (possibly skilled personnel but definitely equipment and funds) to effectively conduct fisheries surveillance and enforcement activities in the FZ.

If not already in pipeline, a programme should be developed and implemented, with whatever available funds from Government and donor agencies, to develop the Coast Guard into an effective force in terms of customs and excise, drugs and fisheries surveillance and enforcement, along with its other responsibilities such as search and rescue and territorial defence.

In the meantime, consideration should be given (if possible legally and technically) to conversion of two of the six laid-up stern trawlers owned by Guyana Fisheries Limited (GFL) into Coast Guard patrol vessels. Also, Guyana may seek to cooperate with neighbouring countries and/or CARICOM countries in fisheries surveillance and enforcement as is being done among the OECS countries.

3.3.7 Offshore Industrial and Inshore Artisanal Fisheries Production and Exports

Table 4 provides shrimp and fin-fish production information for the period 1983-1992, while **Table 5** provides shrimp, fin-fish and by-products export information for the period 1987-1992. **Figure 4** shows the trends in production for prawns, seabob and fish (whitebelly, and marine fin-fish) for the period 1983-1992, while **Figure 5** shows the export trends for prawns, seabob and fish (whitebelly, and frozen marine fin-fish) for the period 1987-1992.

TABLE 4: EXPORT INFORMATION (MT)

1987 - 1992

ITEMS	1987		1988		1989		1990		1991		1992	
	VOLUME (MT)	VALUE (US\$)	VOLUME (MT)	VALUE (US\$)	VOLUME (MT)	VALUE (US\$)	VOLUME (MT)	VALUE (US\$)	VOLUME (MT)	VALUE (US\$)	VOLUME (MT)	VALUE (US\$)
PRAWNS (Frozen)	2,286.23	25,194,272.20	1,928.87	21,256,147.40	1,891.98	20,849,619.60	1,664.59	13,055,720.18	1,921.67	13,976,722.97	1,525.57	11,095,811.9
SEABOB AND WHITEBELLY (Frozen/Processed)	292.06	1,391,293.30	620.86	2,052,563.16	716.30	2,368,087.80	661.70	1,869,860.37	1,054.94	2,906,359.75	1,203.54	3,315,757.7
SEABOB AND WHITEBELLY (Dried)	N.A.	N.A.	14.25	59,143.00	2.96	8,338.11	7.50	42,467.03	18.20	73,474.23	33.81	147,841.
FIN - FISH (Frozen)	765.90	1,678,845.37	726.95	1,602,197.80	930.65	2,051,152.60	1,320.01	2,909,302.04	1,978.97	4,361,649.88	2,746.87	6,054,101.
SALTED FISH	N.A.	N.A.	10.00	18,873.00	5.94	9,331.56	137.77	323,536.57	336.72	523,785.94	323.22	649,397.
SMOKED FISH	N.A.	N.A.	0.05	100	-	-	45.16	96,620.09	31.19	48,971.73	32.33	64,526.
FROZEN CRABMEAT	N.A.	N.A.	0.77	3,273.70	4.15	6,345.10	1.94	10,857.28	10.12	25,002.64	15.56	32,415.
SHARK FINS	N.A.	N.A.	0.82	4,094.00	2.36	24,349.99	7.75	135,673.78	13.17	181,454.98	20.35	516,949.4
FISH GLUE	N.A.	N.A.	0.09	635.00	4.00	22,119.62	10.28	116,929.56	6.89	40,662.24	29.23	392,075.

N.A. Not available

TABLE 5: SHRIMP AND FISH PRODUCTION (MT) 1983 - 1992

ITEMS	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
SHRIMP (Prawns)										
Whole Weight	4240	3430	3040	3808	3846	2995	2896	2504	3069	2370
Tail Weight	2650	2144	1902	2380	2404	181872	1810	1565	1918	1481
Number of Trawlers	149	134	-	-	-	100	94	90	84	79
SHRIMP (SEABOB AND WHITEBELLY) - INDUSTRIAL NUMBER OF TRAWLERS	-	222	943	884	884	884	1655	1831	1864	2684
TOTAL NUMBER OF TRAWLERS	149	134	133	128	129	119	115	122	113	106
* SHRIMP (SEABOB AND WHITEBELLY) - ARTISANAL	1774	1720	1666	1612	1560	1591	1623	1646	1728	1814
TOTAL SHRIMP	6014	5372	5652	6304	6179	6152	6350	6014	7481	6865
FIN-FISH - INDUSTRIAL	4227	5653	4988	4663	4050	3734	2485	2084	2727	2257
* FIN-FISH - ARTISANAL	28150	28381	28565	28840	29008	28310	28205	30124	32538	34112
* NUMBER OF BOATS	1139	1142	1146	1150	1152	1161	1171	1181	1240	1300
* FIN-FISH INLAND (Including Aquaculture)	800	800	800	800	800	800	800	800	800	800
TOTAL FIN FISH	33177	34834	34353	34303	33858	32844	31490	33008	36065	37169

N.B.: Up to 1984 the trawling fleet operated as a Prawns/By-catch and Fin-Fish fleet. From 1985 with the coming into being of B.E.V. Enterprise (Seabob Plant), the fleet divided into prawns/by-catch and seabob/fin-fishing. During 1989, the Department began issuing licences according to the categories specified.

* - Estimated

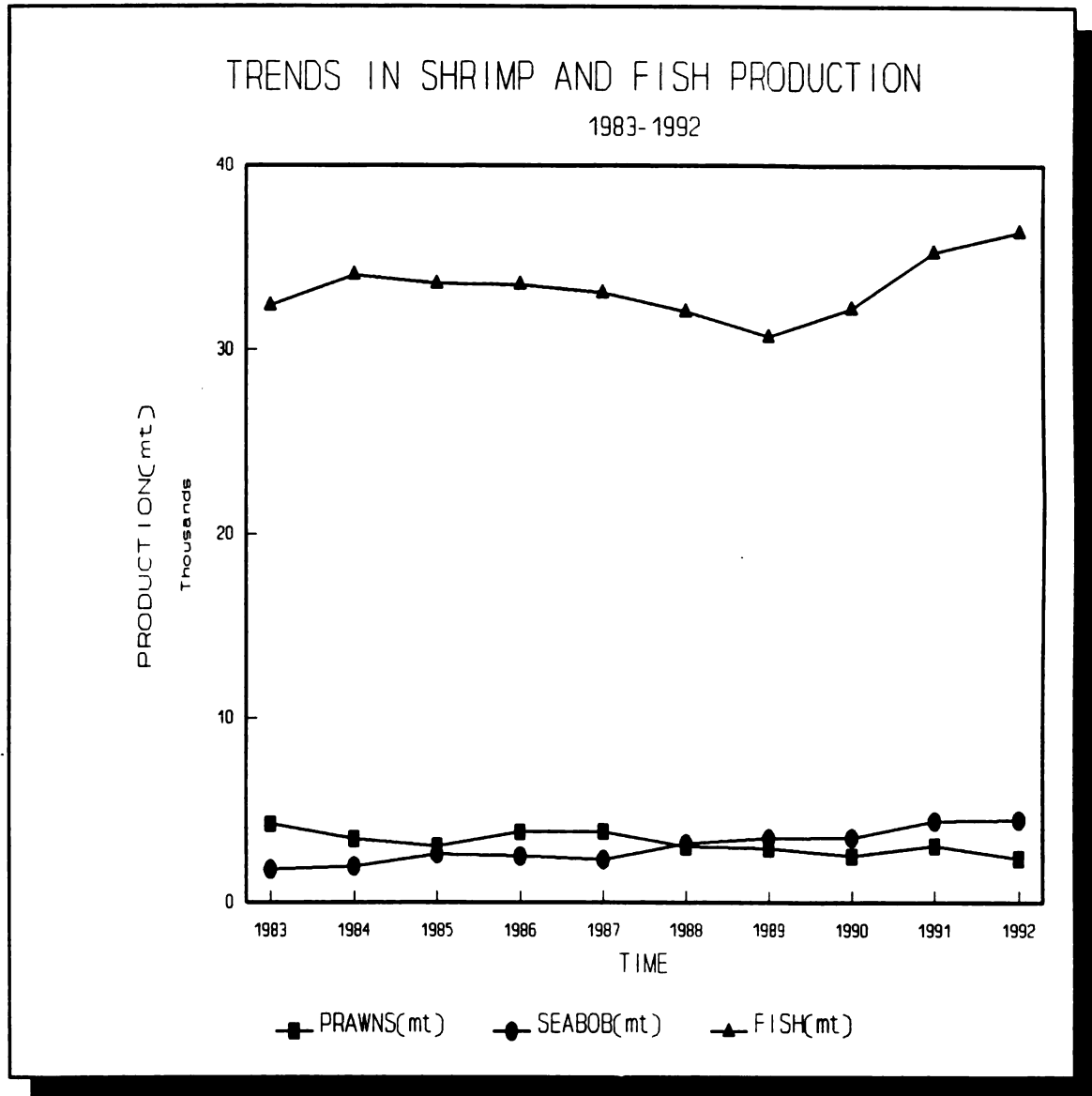


FIGURE 4

3.3.8 Processing and Marketing of Landings from the Offshore Industrial and Inshore Artisanal Fisheries

The Offshore Industrial Fishery has moved from a situation where the main activity was the processing of prawns for export to a more diverse situation where besides prawns, seabob and whitebelly shrimp, and fin-fish are being processed for export (Table 5).

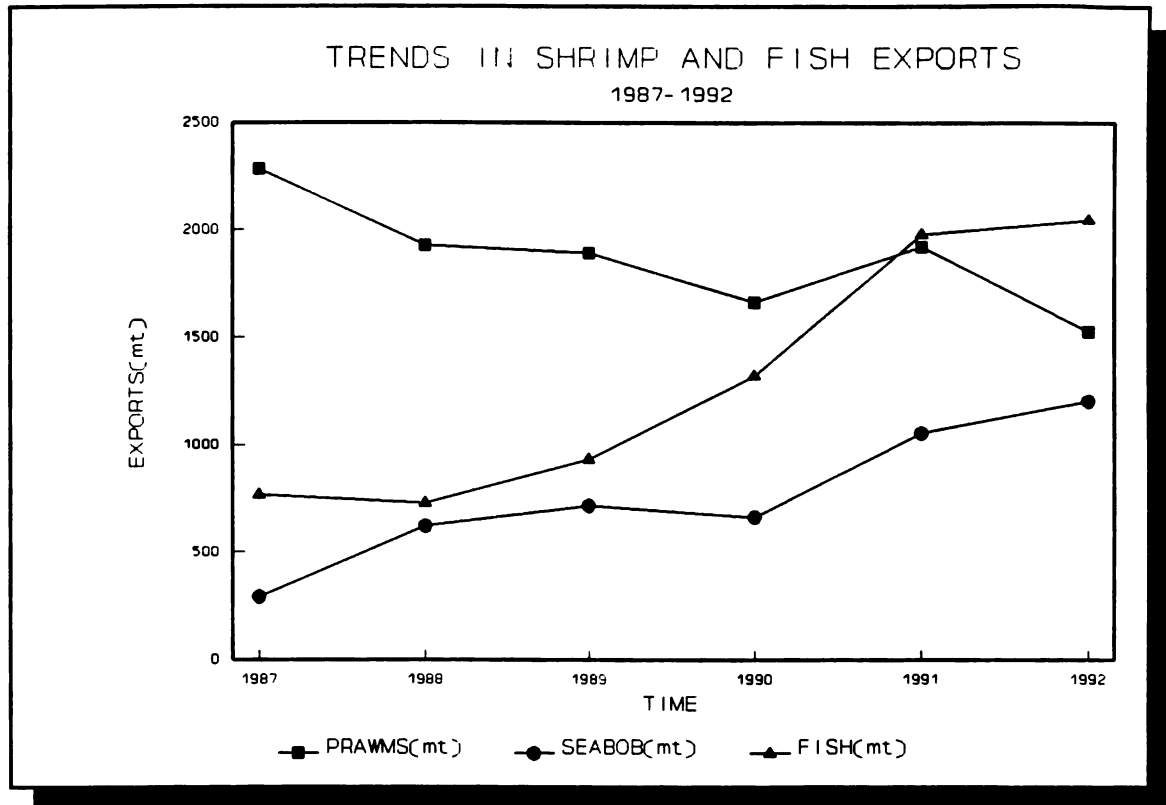


FIGURE 5

Prawns are processed and exported mainly as tails while seabob and white belly shrimp are processed and exported peeled. They are both graded in terms of numbers per pound/kilogram. Fin-fish (frozen) are processed as whole dressed, steaks, fillets, fingers, scraps, etc. in keeping with market requirements. Recently, some plants have been exporting whole dressed fresh fish or fish on ice. Prawns are exported mainly to the U.S.A and Japan while seabob and whitebelly shrimp are exported mainly to the U.S.A. Fin-fish exports are mainly to CARICOM countries such as Jamaica, Barbados and Trinidad and Tobago, the U.S.A., and Venezuela.

The main processors of prawns, using mechanical lines, are GS&TC and MFPL, while BEV and NHS do some limited processing, manually. BEV and NHS are the main processors (using mechanical lines) of seabob and whitebelly shrimp. BEV, MFPL, NHS, and GS&TC all use a mix of mechanical and manual methods, in the processing of fin-fish, mainly for export. BEV is the major processor in this instance.

GS&TC are about to improve on their capacity to process fin-fish from their trawlers with the addition of a fin-fish processing plant.

Besides processing of seabob coming from the local trawler operators, BEV and NHS also purchase seabob and whitebelly shrimp from the chinese seine operators, especially in the low season for trawler landings. In addition to processing the fin-fish from trawlers, BEV, MFPL, and NHS process fin-fish purchased from operators in the Inshore Artisanal Fishery.

Future development in the processing side of the Offshore Industrial Fishery should be based on optimising the use of underutilised equipment capacity as well as rationalisation in terms of the use of equipment. With this in mind, the Fisheries Department's data on plant capacities and utilisation, which dates back to 1988, should be updated. New equipment should only be brought in for the following reasons:

- a) Replacement of old equipment.
- b) Expansions due to the need for added capacity.
- c) Product diversification.

The effects of plant expansions and/or the addition of new plants on the resource management process must not be overlooked. With this in mind, the licencing of fish processing plants should not be seen only as a revenue earning process but as another tool which could be used to achieve sustainable offshore fishery development.

The linkages between the Offshore Industrial and Inshore Artisanal Fisheries in the areas of processing and marketing should be encouraged as this would assist in the optimum utilisation of existing plant capacities as well as the experiences of the plant operators in quality control and export marketing.

More attention needs to be paid by companies to product development and marketing, especially for the non-traditional exports such as seabob, whitebelly, shrimp and fin-fish. Attention should be given to accessing other markets such as the U.S.A, CARICOM as well as in Europe and possibly South East Asia with traditional products.

It should be noted that the Offshore Industrial Fishery is mainly export oriented and as such its development should be aimed at making it a net foreign exchange earner.

The Inshore Artisanal Fishery provides fin-fish and shrimp (whitebelly and seabob) which go mainly towards helping to satisfy the nutritional needs of the domestic population. About 80% of the fin-fish landed is sold fresh or fresh on ice while of the remaining 20%, about 15% is processed into frozen products by such plants as BEV, MFPL, NHS and Tropical Food Products Ltd. (TFPL). Some 5% is processed into dried and smoked products by processors operating at a cottage industry level. Of the shrimp landed, about 50% is sold fresh to consumers. Of the remaining 50%, 47% is sold to cottage processors of dried shrimp and 3% to such plants as BEV, NHS and TFPL for processing into frozen peeled shrimp.

The fish and shrimp landed are marketed by various means, these include:

- a) Vendors purchasing from boatowners for sale by cart or bicycle into the community.
- b) Vendors purchasing from boatowners for sale in municipal markets or at roadside markets, especially on paydays by sugar estates.
- c) Sale of fish and shrimp at outlets and supermarkets in Georgetown.
- d) Middlemen purchasing large quantities of fish from vessel owners in outlying areas and transporting them to the processing plants.
- e) Processing plants sending out trucks to purchase fish or shrimp.
- f) Cottage industry processors purchasing fish and shrimp from vessel owners for salting and/or smoking and drying.
- g) Sale of salted and/or smoked and dried products by vendors in markets; at outlets and supermarkets; and by middlemen in the hinterland areas.

There is some exporting of fin-fish and shrimp by such companies as BEV, MFPL, NHS and TFPL, a licenced processing company dealing in frozen fin-fish and shrimp and smoked fin-fish. Some of the cottage industry operators as well as some individuals, export frozen fin-fish, salted and smoked fin-fish, and dried shrimp and other by-products such as fish bladders and shark fins.

About 50% of the frozen fin-fish products is exported while less than 3% of the fresh fish or fish on ice is exported. Approximately 42% of the dried and smoked fish are exported, mainly to Trinidad, St. Lucia and Jamaica. About 12% of the dried shrimp is exported, mainly to Jamaica, Holland and the U.S.A., while over 90% of the frozen peeled shrimp is exported.

In 1992, an estimated 900 mt salted and/or smoked and dried fish and 300 mt dried shrimp were produced by over eighty (80) cottage industry processors located in Regions 2, 3, 4, 5 and 6. About twenty (20) of these processors produce salted and/or smoked and dried fish and dried shrimp for export (Table 5).

The cottage industry for salted, smoked and dried fish and shrimp has the potential to process and preserve larger quantities of fish and shrimp which could be exported or sold in hinterland areas and mining camps, where cold storage facilities are not so readily available. Since it is a labour intensive industry it can create jobs in rural areas. However, most processors are faced by the following constraints:

- a) Failure to get Central Housing and Planning Authority (CHPA) and Central Board of Health clearances to continue operations and become licenced as processing plants. This is because the processing is being done in residential areas or in squatting areas.
- b) Limited land space for expansion.
- c) Inadequate storage, processing and drying facilities.
- d) Limited knowledge of the techniques for processing and preserving fish and shrimp.
- e) Limited knowledge of quality control techniques and marketing.

Regulatory agencies such as the CHPA, the Central Board of Health, the Fisheries Department and the Guyana National Bureau of Standards (GNBS), along with developmental agencies such as GAIBANK and the Institute of Private Enterprise Development (IPED) would help in overcoming some of these problems by collaborating in the following ways:

- a) Identifying land (cottage industry parks/sites) suitable for the establishment of processing facilities (salting, smoking and drying) in Regions 2, 3, 4, 5, and 6.
- b) Putting in place the basic infrastructure and leasing/renting space to existing and potential processors for construction of facilities.
- c) Providing loans for the development of processing facilities.
- d) Providing the necessary approvals for licencing as processing plants.
- e) Providing training in the areas of processing, quality control and marketing.

3.3.9 Quality Assurance

Within the Offshore Industrial Fishery a great deal of effort is placed on quality control, especially as it relates to products for export. The lapse tends to occur with the by-catch sold as "mixed fish" to local salt fish processors and consumers.

In the Inshore Artisanal Fishery, with both the fresh and salted, smoked and dried fish, not a great deal of attention is paid to quality control. This is perhaps due to most of the fish being sold locally at relatively high prices and with the local consumer seeming to overlook quality for quantity.

There has been some change with regard for maintaining the quality of fish by those fishermen who sell their catch to processing plants for export, due to the fish being rejected or purchased based on quality. This also applies to some cottage processors who prepare products for export.

The need to improve the quality of fish and fish products on the local market, as well as to maintain the good quality of fish and fish products being exported is recognised. This is especially important in light of new laws and regulations of some importing countries such as the U.S.A., Canada, and the EEC regarding the quality of fish and fish products which can be imported into these countries.

With this in mind the GNBS, GAHEF and the Fisheries Department have held a series of workshops focusing on quality assurance mechanisms to ensure quality products for export and local consumption. These workshops were as follows:

- a) "Information Session on New Quality Requirements of Importing Countries for Fish and Fish Products," May 22, 1992. This session targeted Fishermen's Cooperatives, industrial processors, cottage processors and regulatory and development agencies.
- b) "GNBS/DOF/GAHEF/FAO/DANIDA Workshop on Quality Assurance in the Fish Industry," November 27-30, 1992. This Workshop targeted industrial processors, regulatory agencies and development agencies.
- c) "GNBS/DOF/FAO Workshop on Fish Technology and Quality Assurance for Small-scale Fish Processors," June 28-30, 1993. This Workshop targeted processors in the cottage industry.

It has since been recognised that a more organised approach will have to be taken for introducing, maintaining and monitoring quality assurance systems in the Fishing Industry if the goal for improvement of the quality of fish and fish products for local consumption and exports is to be reached. With this in mind the GNBS, the Fisheries Department and GAHEF are in the process of drafting a programme for the establishment of national quality assurance system for fish and fish products.

The system will be based on the Hazard Analysis Critical Control Point - Good Manufacturing Practices (HACCP - GMP) approach being advocated by major importing countries. HACCP involves identification and control of hazards while GMP involves utilisation of good sanitary and hygienic practices (Bentick, 1993). The programme will deal with the establishment of HACCP based systems on fishing vessels, at landing sites, in processing plants, etc. and the development of an effective inspectorate. Technical assistance from agencies such as the FAO and UNIDO will be required in the implementation of this programme.

3.3.10 Public Sector Investment

3.3.10.1 Guyana Fisheries Limited (GFL)

The GFL was created in 1979 in an effort to consolidate the state holdings: Guyana Food Processors Ltd.; Guyana Marine Foods; and Guyana Industrial Holdings, in the Offshore Trawl Fishery. In keeping with the Economic Recovery Programme 1991-1993, GFL was divested. The divestment took the following form:

- a) Twenty one (21) trawlers were sold to buyers inside and outside of Guyana.
- b) The Mc Doom dock facilities including the processing plant, shipway, machine shop and six (6) FRP stern trawlers were eased to MFPL in April, 1990.
- c) Berthing and other space at the Houston Fishport Complex were rented to NHS in November, 1990.
- d) Berthing and other space at the Houston Fishport Complex were rented to other individuals and companies such as E. Faerber, L. Sanmoogan and Romar Co Ltd. from 1990 to present.

As matters now stand it would appear as though MFPL owes GFL a substantial sum of money due to the fact that MFPL had arbitrarily cut back on their monthly lease payments in an attempt to bring about some negotiation on a reduction in the monthly payments on the grounds that the economic circumstances had changed. At least two committees had been established to make recommendations on this matter but no decision was made.

The following options can be considered:

- a) Renegotiate the Agreement, after first analysing each of the four areas previously identified and determine the causes for profit and loss. Prior to any new agreement, MFPL must put forward a documented programme for the development of the company with a view to overall and sustained profitability as well as a proposal to clear off any outstanding monies owed to GFL.
- b) GFL could determine the agreement and advertise once more for divestment.

Due to the level of expansion that has been undertaken by NHS since the initial rental in 1990 of berthing and other space at the Houston Fishport Complex, it may be opportune at this time to review the rental agreements this Company has with GFL to come up with a more comprehensive one that would be beneficial to both parties.

All other agreements for berthing should be reviewed with the view to standardising the terms offered (if this has not been done already) and seeking to improve on the returns to GFL.

After all these matters have been sorted out a decision should be taken with regard TO GFL as the Company would no longer be involved in fishing and processing, but simply monitoring the various agreements and collecting rentals. For example, these functions could be undertaken by the state owned NICIL (National Industrial and Commercial Investment Ltd.).

3.3.10.2 Guyana Libya Fishing Company

This Company started in 1981 and represents a joint venture between the Governments of Guyana and Libya with a view to operating a trawling fleet for the production of prawns for export. Its operations, since the acquisition of ten trawlers, has been characterised by vessel breakdowns, lack of spare parts and inadequate fleet management which has kept the Company from achieving its objectives. At present, less than three (3) vessels from the fleet are operational.

The following options can be considered:

- a) The State could dispose of its shares in the Company.
- b) Bearing in mind the likely debt situation, the State could move for the liquidation of the Company.

3.3.10.3 Artisanal Fisheries Infrastructure Complexes

The Artisanal Fisheries Infrastructure Project (AFIP), resulting from the Draft Fisheries Development Plan 1979-1983, was implemented from 1984 to 1993 with assistance from CIDA and the EEC. The EEC and the Government of Guyana (GOG) funded the establishment of the inshore fishport complex at Meadowbank in 1987, while CIDA and GOG funded the establishment of inshore fishport complexes at #66 (1988) and #43 (1990) on the Corentyne, Rosignol (1988), Parika (1991), Lima (1988), Charity (1993) and Morawhanna (1993). The entire Project involved the expenditure of over G\$1 billion.

The facilities to be found at each Complex are set out in **Table 6**.

Table 6 - Plant and Equipment Provided under Artisanal Fisheries Infrastructure Project

LOCATION	WHARF	RAMP	ICE STORAGE	FISH STORAGE	FISH MARKET	SUP. STORE	ICE MACH.	W/SHOP EQUIP.	BOX STORE	BULK STORE	LOCKERS	W/SHOP	FUEL STORE.	WATER RES.	GENERATOR CAPACITY
#66 Village Corentyne	124*20'	50*70'	50 tons 24*36'	10 tons 24*28'	20*30'	36*16'	2 No. 10 tons/ day	Wood W/ing mach., Eng. repair tools.	32*8'	36*16'	60*14'	26*36'	Gas 2/2000 gl Diesel 1/2000 gl Kero 1/600 gl	12000 gls + 1000 gls	Generator
Rosignol	NIL	60*20'	15 tons 20*24'	NIL	32*23'	NIL	1 No. 5 tons/ day	NIL	NIL	NIL	NIL	NIL	NIL	50000 gls + 1000 gls	Generator 48 kw / 60 kva
Lima	NIL	NIL	26*23'	NIL	18*26'	20*22'	1 No. 5 tons/ day	Engine repair tools	NIL	9*22'	23*5'	20*16.6	Gas 1/2000 gl Diesel 1/2000 gl Kero 1/600 gl	20000 gls + 1000 gls	Generator 48 kw / 60 kva
#43 Village Corentyne	30*10'	51*71'	20*14'	10 tons 20*27'	NIL	15*36'	NIL	Wood W/ing mach., Eng. repair tools.	15.6*18'	15.6*18'	24*21.6'	31*36'	Gas 1/2000 gl Diesel 1/2000 gl Kero 1/600 gl	20000 gls + 1000 gls	
Charity	100*20'	51*51'	30 tons 20*32'	15 tons 20*40'	40*25'	50*20'	1 No. 5 tons/ day	Wood W/ing mach., Eng. repair tools	10*10'	50*20'	38*20'	40*37'	Gas 1/2000 gl Diesel 1/2000 gl Kero 1/600 gl	12000 gls + 1000 gls	Generator 48 kw / 60 kva
Parika	120*10'	50*70'	30 tons 30*30'	20 tons 26*20'	20*30'	10*26'	2 No. 5 tons/day	Wood W/ing mach., Eng. repair tools	40*8'	25*18'	25*22'	20*25'	Gas 2/2000 gl Diesel 1/2000 gl Kero 1/600 gl	12000 gls + 1000 gls	Generator 75 kw / 85 kva

Table 6 Continued

LOCATION	WHARF	RAMP	ICE STORAGE	FISH STORAGE	FISH MARKET	SUP. STORE	ICE MACH.	W/SHOP EQUIP.	BOX STORE	BULK STORE	LOCKERS	W/SHOP	FUEL STORE.	WATER RES.	GENERATOR CAPACITY
Morawhanna	70' * 12'	20' * 60'	20' * 32'	26' * 20'	NIL	16' * 12'	2 No. 5 tons/ day	Wood W/ing mach., Eng. repair tools	16' * 12'	16' * 8'	NIL	20' * 40'	Gas 2/10000 Diesel 5000 g/l Kero 1/1000 g/l	75000 g/l + 1000 g/l	2 Diesel 75 kva Generator
L.F.P.C. Gr. G/Town			2-2 tons	(Has 1-15 ton blast freezer)			2 No. 15 tons						Gas 1/2000 g/l Diesel 1/400 g/l		Generator

The objectives of the AFI Project were to:

- a) Reduce post-harvest losses and thereby increase the supply of fish to the local market and for export.
- b) Increase the productivity and incomes of artisanal fishermen.
- c) Move the existing Fishermen's Cooperatives toward the role of local organisation of producers and marketers.

Of the eight (8) complexes constructed, six have so far been turned over to Fishermen's Cooperative Societies (Table 7) for management and operations.

Table 7: Fishing Complexes and Responsible Fishermen's Cooperative Societies

Fishing Complexes	Cooperative Societies
Inshore Fishport Complex, Meadowbank, Georgetown.	Greater Georgetown Fishermen's Cooperative Society Limited (GGFCSL).
Rosignol Inshore Fishport Complex, Berbice.	Rosignol Fishermen's Cooperative Society Limited (RFCSL).
#66 Inshore Fishport Complex, Berbice.	Upper Corentyne Fishermen's Cooperative Society Limited (UCFCSL).
#43 Inshore Fishport Complex, Berbice.	Corentyne Pin Seine Fishermen's Cooperative Society Limited (CPSFCSL).
Parika Inshore Fishport Complex, Essequibo.	Essequibo Islands/ West Demerara Fishermen's Cooperative Society Limited (EI/WDFCSL).
Lima Inshore Fishport Complex, Essequibo.	Essequibo/ Pomeroon Fishermen's Cooperative Society Limited (E/PFCSL).

These Societies' Complexes provide goods and services to their members and non-members and have to varying extents been contributing to the achievement of objectives (a) and (b), unfortunately none of them have made any headway in achieving objective (c) (Nwike, 1993).

If they are to improve on their levels of achievement of project objectives and obtain sustained profitability, the Societies managing the Complexes will need to overcome the following problems, which affect them all to varying degrees:

- a) Insufficient skilled and experienced personnel at the Committee of Management and staff levels to manage the affairs of the complexes efficiently.
- b) The lack of operational funds required to properly start up the complexes.
- c) The underutilisation of some components (ramps, wharves, fish storage rooms, fuel depots and workshops) of the facilities.
- d) The non-involvement of the Societies in the marketing of their members (and non-members) catch.

It should be noted that training in management (cooperative, financial and personnel), accounting, purchasing and marketing was provided to the Committees of Management and staff of these Societies under the recently terminated GOG/CIDA Fisheries Equipment Facility. It is felt however, that the training activities have had limited success in bringing about effective management and operations of these complexes.

Bearing in mind the differing levels by which each complex is affected by the above stated problems, a range of solutions can be proposed. These include:

- a) Strengthening the Committees of Management of some Societies such as UCFCSL, RFCSL, EI/WDFCSL and E/PFCSL by appointing from the communities two or three individuals with skills in commerce, management, and other relevant areas. This would help to guide the Committees in determining appropriate policies and plans for the development of the complexes. This would require some amendment to the Cooperatives Act.
- b) Access Canadian Executive Service Overseas (CESO) and other low cost consultants to spend some time at each of the Complexes helping Committees and respective management staff apply the training they were exposed to in streamlining systems for management and operations as well as assisting in the drawing up of plans to fully utilise all components of each complex.
- c) Merging UCFCSL with CPSFCSL as the former appears to have developed, both at the Committee and management levels, the skills necessary to manage and operate both #66 and #43. UCFCSL also has some funds which can be used to facilitate a proper start up at #43. This should lead to efficient utilisation of facilities such as wharves, ramps, workshops, etc. at both complexes as well as the ice produced at #66. Fair representation for all the areas (#79, #66, #43, etc.) on the new Committee of Management would have to be assured by way of the Rules of the new Society.
- d) Acquiring by way of a joint venture (involving local and/or foreign entrepreneurs) with GGFCSL the necessary skills, technology and possibly capital needed to activate the processing and marketing aspects of the Complex at Meadowbank. This may be one of the keys to getting the other complexes to purchasing members catch for on-sale to the joint venture for processing and marketing as well as to other processing plants already in operation in that area (East Bank Demerara).

The study on the feasibility of the involvement of the cooperative societies in the marketing of member's catch as suggested in the recently published, "Assessment of the Effects of the Artisanal Fisheries Programme" (Nwike, 1993), Coming out of a survey

conducted by the Planning Division and the Fisheries Department of the Ministry of Agriculture, should still be pursued to determine the best approach as it relates to achieving the third objective.

Drawing from the experiences gained in relation to the management and operations of the six (6) operational complexes by the respective Cooperative Societies, the Fisheries Department and CIDA have formed the opinion that of the two remaining complexes, the one at Morawhanna should not be leased to the Morawhanna Fishermen's Cooperative Society Limited as the Society has neither the level of organisation nor the funds to acquire the skills and inputs necessary to start up and manage the complex. Likewise, the complex at Charity should not be leased to the E/PFCSL as even though they have had some success with the management and operations of the Lima Complex they have not fully developed the skills to take on the added management of the Charity Complex. Neither do they have access to the funds to start it up. Thus, it has been suggested that these two Complexes be advertised for the establishment of joint ventures, possibly between local and/or foreign entrepreneurs, the Government and the Cooperatives in question.

The role of the Cooperatives Department in strengthening cooperatives at the organisational level, as well as in monitoring the management and accounting systems of their businesses and conducting external audits of the societies and their businesses, should not be overlooked. If that Department is provided with the necessary resources to carry out these activities it can contribute in no small way to improved management and operations at the complexes.

3.4 Inland Fishery

Inland Fishery has to be viewed in terms of the exploitation of the living resources in the rivers, creeks, reservoirs, canals as well as in the savannah areas where the seasonal increase in rainfall gives rise to large expanses of seasonally flooded lands.

3.4.1 Inland Fishery Resource

Flowing Waters - Rivers, Creeks, etc.

These waters, the majority being the "blackwaters" typical of rain forest regions, are characterised by a reddish-brown stain of humus compounds, an acid or very acid reaction and a low level of dissolved minerals. Although levels of biological production are low, where these waters are retained in lakes or canals, their nutrient status and productivity tend to rise.

Many of these waters do, however, support a diverse population of fish, often reaching large sizes. This apparent anomaly between a low productive environment and the 'abundance' of catchable fish could be due to the very low levels of exploitation to which these waters have been subjected.

Until recently, this has been essentially an under-exploited Fishery with small-scale trapping and net fishing for subsistence of local riverside communities, Amerindian Settlements, mining camps, and others.

It is noteworthy that at the small levels of exploitation now current, the steady increase in fishing pressure has brought about a decline in the sizes of some of the fish caught and an increase in the effort needed. These effects are undocumented but generally reported.

Any great increase on the pressure of these stocks will lead to a removal of the favoured fish and their slow replacement. This would give the impression of the waters being quickly 'fished out'. Therefore, despite the abundance of waters, and the apparent richness of their fish stocks, the production levels are too low to support a sustainable yield at any level of fishing much above fishing for subsistence requirements.

Flood Plains

Areas which seasonally alternate between dry savannah grasslands and a shallow flood-plain caused by heavy rainfall and rising rivers over-lapping their banks, usually have a high level of fish production. This production is derived from the abundance of nutrient materials from the dry land. Fish abundance increases through the movement of breeding fish onto, and the growth of young fish in these regions of good food supply.

There are some forty or fifty thousand sq. km. of these seasonally inundated flood-plains in the south-western areas of the Country (especially the Rupununi) and a potential of up to 100 tonnes per square kilometre may be achievable.

3.4.2 Fisheries Management and Resource Assessment

Efforts should be aimed at enforcing management initiatives already in place while seeking to conduct some assessment of the inland fishery resource.

Coming out of the experiences gained in conducting resource assessment in the Marine Fishery, the Fisheries Department would have developed some capacity to update resource surveys as well as conduct surveys of a similar nature in other water bodies.

Utilising this capacity the Department could undertake to conduct an assessment of the living resources in the inland waters with a view to:

- a) Determining the resource potential of both the fish being utilised as food as well as the fish being caught for export as ornamental fish.
- b) Devising appropriate management strategies taking into consideration those in place. For example, the social and cultural practices of the indigenous Amerindian Communities in relation to management of the hinterland fishery resources could be examined with a view to maintaining and improving on such approaches rather than seeking to impose new models which are not enforceable.
- c) Setting up a properly designed system for monitoring inland fishery activities.
- d) Making recommendations on the appropriateness of the fishing gear in use as well as suggesting other means, if need be.

3.4.3 Subsistence Fishery (for food)

3.4.3.1 Description of the Subsistence Fishery

This Fishery involves the catching of fish in rivers, lakes, canals, flood plains, etc. by subsistence or part-time fishermen for their own consumption or for sale. The activity tends to be influenced by the season and in some areas by the down periods for agricultural and other activities. For example, in the sugar estate areas the intensity of activity varies with the sowing and harvesting of the sugar cane. Small flat bottomed dory type vessels and cast nets, seine or handlines are used in the exploitation of the fish.

The Fishery will continue to contribute to the protein requirements of the population as well as to improve incomes for those involved, bearing in mind the high price for which the fish caught are sold. However, there would be some need to improve on the method of fish handling and preservation with a view to getting more wholesome fish to the consumer. The availability of ice from the Artisanal Fisheries Infrastructure Complexes would most likely impact in this area but transportation would be a serious constraint.

Methods of preservation such as salting and smoking should also be encouraged in the flood plain areas so as to preserve fish during glut for the leaner periods.

It should be noted that within this Fishery there exists the opportunity for the development of a Recreational or Sports Fishery. The development of such a Fishery within the framework of a developing Tourist Industry could lead to enhanced foreign exchange earnings.

3.4.3.2 Harvesting of the Resource.

Fishing for the immediate needs of home, community or mining camp, develop wherever there are stocks of fish and a demand. The gear (mostly gillnets, castnets and traps) and its operation generally involves only a small financial commitment on the part of the fishermen. This lack of economic pressure to amortise large capital expenditures or service debts, means that the subsistence fisherman will readily respond to any decline in the stocks by a reduction in his fishing efforts. This flexibility of exploitation means that in general, subsistence fishing tends to bear a relation to the size and productivity of the fish stocks and is not destructive of the resource.

An exception to this conservative exploitation is the use of fish poisons and explosives which may be totally destructive of fish over limited areas. Hence, the need to educate those involved against using these practices as well as to seek to enforce the regulations, where feasible.

Due to its incapacity to monitor the production in this Fishery the Department for some time now (since 1983) has been using an annual production estimate of 800 mt (which covers Inland Fisheries and Aquaculture).

3.4.3.3 Processing of the Fish caught from the Subsistence Fishery.

Most of the fish caught are consumed in the fresh state with little or no processing taking place. In hinterland communities, however, there is some salting and smoking of fish as a means of preservation.

Some attention should be paid to fish handling and preservation with a view to getting fish of a better quality to the consumer. In coastal communities where such fish are caught and sold at a roadside or municipal markets, vendors should be encouraged to utilise improved handling and storing methods.

In hinterland areas, especially the flood plain areas, technical assistance should be provided to the catchers, processors and consumers through the Regional Administrations in the areas of salting and smoking. This will assist in the upgrading of and passing on of knowledge with a view to having more fish preserved during the glut periods for storage into the leaner periods.

3.4.3.4 Marketing

The fish caught within this Fishery are either consumed directly by the fisherman and his family or sold by the roadside; in municipal markets; and in other cases taken up or down river or creek and sold to consumers in these areas.

To some the eating of "bush fish" is normal fare while to others it is a delicacy for special occasions.

3.4.4. Ornamental Fish Export Fishery

3.4.4.1 Description of the Ornamental Fish Export Fishery

There is a small but active trade of ornamental fish. Live fish are caught in the upper reaches of the rivers by collectors and brought and sold on the coast to six exporters of ornamental fish. In 1992, 3.2 million fish valued at G\$19.7 million were exported, mainly to the U.S.A. Table 8 provides further information on ornamental fish exports for the period 1988 -1992. The present restriction on the number of licences (5) being issued for export should remain in force until more is known about the resource being fished. The possibility of a closed season from June 1 to July 31 each year should be considered.

The contributions of this Fishery were not included in the Sub-sector's inputs to the GDP, total domestic export earnings nor in the characteristics of the Sub-sector.

Table 8: Aquarium Fish Exports 1988 - 1992

Year	Number	Value G\$
1988	3,355,201	1,647,100.00
1989	4,186,564	5,088,600.00
1990	6,214,987	15,801,130.00
1991	4,151,150	21,936,427.00
1992	3,233,478	19,671,419.00

Source: Fisheries Department, 1993.

3.4.4.2 Exploitation of the Resource

Ornamental fish are caught mainly in riverain areas by collectors utilising outboard engine powered craft and varying fishing gear (dragnets/seines, dipnets, pin-seines).

At present, most of the ornamental fish caught and exported come from the following water bodies:

- Canje River
- Berbice River
- Abary River
- Mahaicony Creek
- Mahaica River
- Upper Demerara River
- North West Area (vicinity of Morawhanna)
- Essequibo River

The intention should be to optimise on the foreign exchange earnings from this Fishery as well as to improve on its contributions in terms of wildlife levy and revenue in general with a view to providing monies for further development.

This could be done by way of constant invoice price reviews while implementing an increased license fee for exports.

Besides the above, attention should be paid to assessing the resources in the Fishery with a view to determining its developmental possibilities.

The Fisheries Department should also seek to encourage exporters, as individuals or as a group, to conduct research into breeding selected species of ornamental fish in captivity. This would be done by providing technical assistance by way of foreign agencies possessing such expertise. The results of such activities could lead to an increase in the exports of high priced aquarium fish.

3.5 Aquaculture

3.5.1 Brackish Water Culture

Brackish water culture occurs mainly in the brackish water swamps along the Atlantic Coast in Corentyne, Berbice. Sixty four farms, which includes two registered fish culture cooperatives, utilize approximately 670 ha of coastal lowlands in what can be described as controlled exploitation of coastal swamps for a variety of fin-fish and shrimp species. The average size of a farm is 11 ha.

Utilizing tidal inflows of high tides, juveniles, larvae, eggs, etc. are trapped in the coastal empoldered swamps and allowed to mature to marketable size. In 1987, it was estimated that

91 mt of fish and shrimp were harvested from 400 ha of these swamps.

3.5.2 Freshwater Culture

Freshwater pond culture of *Tilapia mossambica*, *Tilapia nilotica* and to a limited extent, *Hoplosternum littorale* are the main species cultured in Guyana. This type of culture produced an estimated 34 mt of fish in 1987 from about 115 ha of ponds. The major producer is the Guyana Sugar Corporation Ltd., a parastatal sugar producing company, with about 40 ha of production ponds. Some schools and individual subsistence farmers are also involved. Government established the Botanic Garden Fish Culture Station to conduct research and pilot scale demonstrations and to supply fingerlings to fish farmers. This Station is now completely run down.

3.5.3 Aquaculture Development

The present situation in aquaculture is one where the level of development has been very slow even though there has been a great deal of interest by the Fisheries Department and other participants in bringing about an improvement in the pace. This is mainly due to the lack of funds, skills, equipment, and infrastructure for aquaculture in the Department to facilitate research, technology development and extension activities as well as the heavy initial capital cost involved in establishing an aquaculture farm.

The objective of Aquaculture development should be to increase on the number of hectares being utilised in aquaculture as well as on the yield per hectare which would enable aquaculture to impact on improved nutrition for the population, increased employment and incomes and export earnings.

This would involve the acquisition and transfer of appropriate technology through utilisation of experts and training (overseas and local), the establishment and development of research facilities and capacity, and the development of an extension service. The provision of credit facilities and access to heavy equipment would also be vital to the overall development process.

The areas of focus in the developmental approach should be:

- a) Commercial Aquaculture.
- b) Rural, small-scale aquaculture with a view to integrated systems (agro-aquaculture).
- c) Extensive Aquaculture utilising existing water bodies such as reservoirs.

It should be noted that with the existing state of aquaculture in Guyana, the Programme would have to be developed as more medium to long term, i.e. for ten years, rather than just for the medium term. The developmental impact would most definitely be felt in the last five years with the preceding five being given to the creation of the environment for more productive aquaculture.

3.5.4 Aquaculture Technology

At present, the technology employed in brackish water culture can be termed extensive while the technology employed by the Fisheries Department, Guysuco and others in Freshwater Culture is of the monosex pond culture type. The latter system in most cases involve brood ponds, fry ponds, fingerling ponds and food fish production ponds where fertilizers (inorganic and/or organic) may or may not be used and where feeding of some sort may or may not be done.

At present, technologies being utilised would not lead to considerable development in aquaculture as the returns are likely to be low when one considers the investment needed for land acquisition and infrastructural development for fish production.

Attention would have to be paid to acquiring and transferring more appropriate technologies through the use of experts and training, research and in some cases joint ventures. Besides the direct transfer to the end user through joint ventures, improved technologies would be passed on to the end users/fish farmers by an improved extension service operated by the Fisheries Department.

3.5.4.1 External Assistance

In the past, and even to date, technical assistance from external agencies (bilateral and multilateral) has been provided in the area of aquaculture. For example, the IRDC/Guysuco/Fisheries Department/U.G. Aquaculture Project, as part of Guysuco's Diversification Programme. This Project started in 1979 and as a result of financial and technical assistance (in the form of experts, training and equipment) led to Guysuco's commercial venture in aquaculture. USAID provided training for personnel from Guysuco and the Fisheries Department in the early 1980's. More recently FAO, IDB and British Technical Assistance have been providing training and funding for training of personnel from the Fisheries Department. Unfortunately most of these personnel have since left the Department.

The assistance in most cases, however tends to be ad hoc and diffused relating either to poorly planned and/or implemented projects, or no projects/programmes at all.

Efforts should be made to establish better coordination with external agencies such as FAO, with a view to getting them to address specific areas of a national aquaculture development programme. All steps should be taken to avoid duplication of effort while seeking to foster collaboration on an on-going basis.

External agencies should better provide technical assistance (experts, training, equipment) in the areas of: technology transfer, research and extension.

Guyana should also seek to join the Commission for Inland Fisheries of Latin America and the Caribbean (COPESCAL). Membership in these Bodies would put Guyana in a position to share in and benefit from the aquacultural experiences of Latin America and the Caribbean.

3.5.4.2 Joint Venture

Technology transfers can occur through joint ventures involving overseas and local public or private agencies. Here, the foreign firm would provide the appropriate technology (expertise, equipment, etc) and possible access to overseas markets while the local firm would provide land, access to water, labour, suitably qualified staff for training, capital to cover local costs and possible access to local markets.

Steps could be taken to promote a commercial shrimp culture venture along the lines set out above. Whether it would be freshwater shrimp or marine shrimp would depend on the technology being made available and the subsequent feasibility study prior to the commencement of any pilot scale or commercial activities.

The joint venture would appear to be an opportune way to quicken the pace of aquaculture development in Guyana as it involves a direct transfer of technology into a commercial venture such as shrimp farming. There are ready overseas markets for shrimp. The success of such a venture could serve as the impetus for aquaculture development in the short term while a medium to long term programme is being developed for implementation. Some assistance can be provided in getting such a venture off the ground by the Government seeking assistance from agencies such as the FAO to conduct feasibility studies, e.g. for shrimp culture.

3.5.5 Aquaculture Research

3.5.5.1 Research Activities

At present, there would appear to very little being done in Guyana by way of aquaculture research. Efforts should be directed at improving on production systems in both brackish water culture and fresh-water culture in the following areas:

- Commercial Aquaculture;
- Agro-aquaculture, and
- Extensive Aquaculture utilising reservoirs etc.

Research efforts would be aimed at achieving system intensification, which would improve production parameters (increase growth, survival and stock density), through the use of fertilizers (organic and inorganic) and feed. The issues of water quality management as well as those of fish diseases would have to be addressed.

The economics of the various production systems would have to be closely monitored with a view to the utilisation of systems that would give high rates of return.

With Brackishwater Culture the experimentation should be aimed at mixed or polyculture systems while in the freshwater culture the experimentation would be aimed at monoculture and polyculture systems.

With the exception of the tilapia and possibly freshwater shrimp, the research activities should be aimed at the culturing of indigenous species of freshwater fish and brackishwater fish and shrimp.

3.5.5.2 Infrastructure

In terms of the volume of research activities that would have to be undertaken, the existing facilities of the Fisheries Department would appear to be inadequate. Hence, two National Aquaculture Centres/Stations would have to be designed and constructed, one a Freshwater Culture Research Centre in Region 4, possibly Mon Repos, and the other a Brackishwater Culture Research Centre in Region 6.

A Freshwater Culture Research Centre at Mon Repos would benefit from the services and research equipment at NARI as well as to facilitate collaborative work, e.g. agro-aquaculture with that institution.

Each Centre would be designed with the following:

- a) Research and pilot study/demonstration ponds.
- b) Efficient and effective drainage and irrigation systems.
- c) Laboratory.
- d) Hatchery.
- e) Library.

They would have to be properly equipped and staffed.

Priority should be given to the establishment of the Brackishwater Culture Centre/Station due to the level of activity already taking place in this area on the Corentyne Coast. The effects of brackishwater culture on the coastal environment (mangroves and other wetlands) would have to be monitored.

3.5.6 Extension

At present, the Department's capacity to deliver extension services in aquaculture is almost non-existent as there is only one sub-professional in place with formal training in aquaculture. The services should include the delivery of fingerlings to interested parties and advising on the following aspects of fish culture:

- a) Selection of sites for ponds construction.
- b) Design and construction of ponds.
- c) Fertilizing and feeding.
- d) Methods for the control of diseases.

The aim should be to have extension personnel in all Regions with the level of Officer (Fisheries Field Assistant to Fisheries Officer) being dependent on the availability of trained staff and personnel for training and the priority given to aquaculture development in the particular Region. Later, their activities would be expanded in scope to include the preparation of projects for loans, training of fish farmers, demonstration of techniques, and advising on fish handling.

4.0 Institutional Support

The Ministry of Agriculture, Fisheries Department has as its mandate the management, regulation and promotion of the exploitation and development of the Nation's fishery resources.

4.1 Organisation of the Fisheries Department

Figure 6 shows the organisation chart of the Fisheries Department in terms of the basic Units approved by the Public Service Ministry.

4.1.1 Description of Units in the Organogram

(a) Legal and Inspectorate Unit

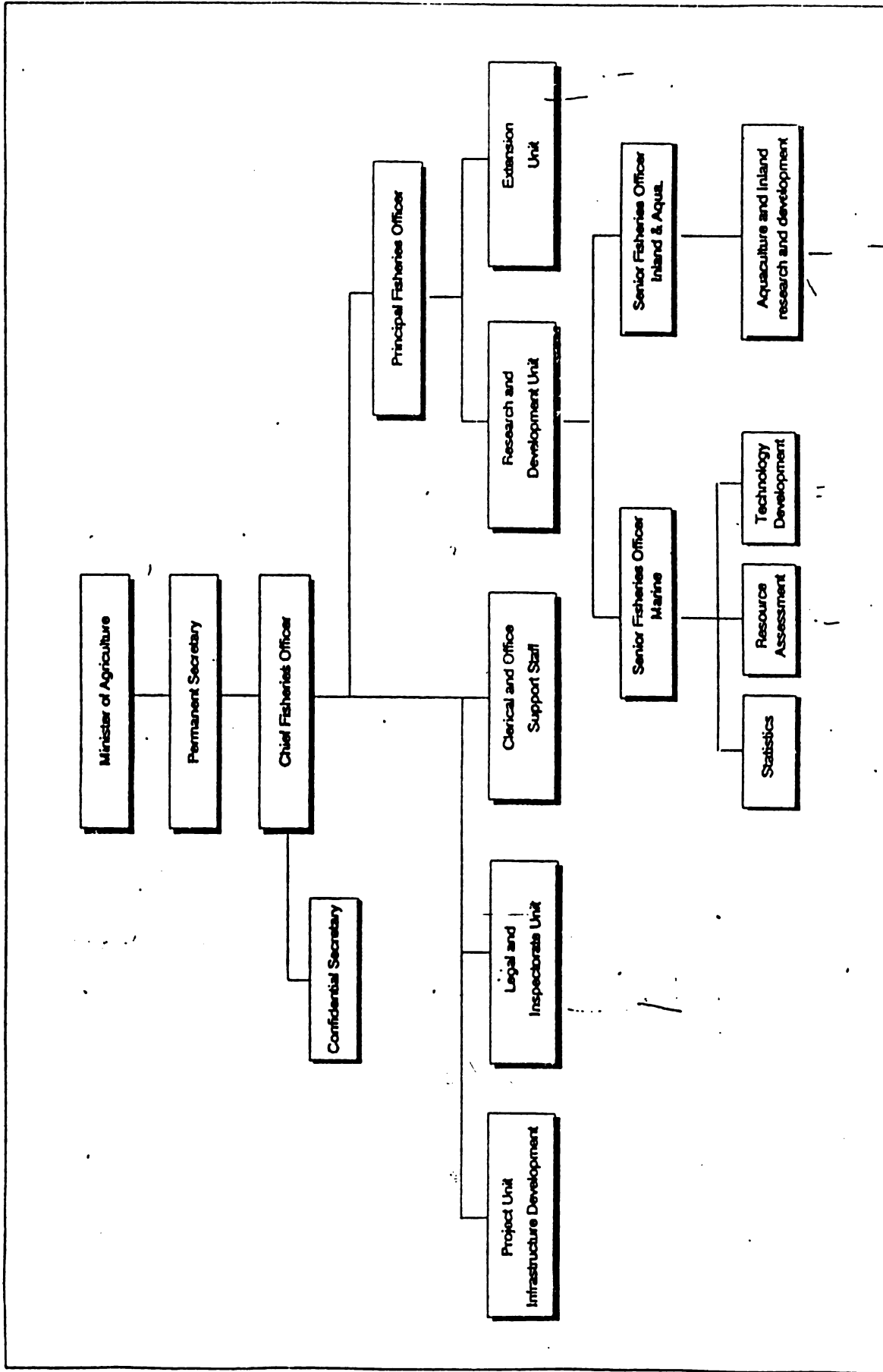
The Legal and Inspectorate Unit is responsible for ensuring the observance of all legal and administrative requirements by all entities in the Fisheries Sub-sector and for recommending new regulations when necessary. This unit liaises closely with the Guyana Defence Force (Coast Guard), Guyana Police Force, Customs and Excise Department, and Harbour Master's Department at the Centre and with Regional Fisheries Officers to whom some of these functions have been delegated.

(b) Research and Development Unit

This Unit has four (4) Sub-units, namely Statistics, Resource Assessment, Technology Development and Inland Fishery and Aquaculture.

1. The Statistics Sub-unit is concerned with collecting and analysing data and conducting surveys to provide scientific and socio-economic information for resource management, policy determination and planning.
2. The Resource Assessment Sub-unit is concerned with stock assessment research and surveys for obtaining resource management information.
3. The Technology Development Sub-unit is concerned with identifying, developing or introducing new and appropriate technologies for resource exploitation and post exploitation (e.g processing) activities.
4. The Inland and Aquaculture Sub-unit is concerned with the development and testing of culture systems for local and exotic fish species.

FIGURE 6



(c) Extension

The Extension Unit is concerned with the acquisition and dissemination of technical information and inputs within the Sub-sector. It liaises with Regional Fisheries Units in relation to artisanal fishery and aquaculture development. It passes on technical information and obtains feedback by way of demonstrations, seminars, workshops, field visits and exhibitions.

(d) Project Unit

This Unit is responsible for the implementation of the Artisanal Fisheries Infrastructure Project. This is a temporary unit.

(e) Clerical and Support Unit

This Unit provides the necessary support service for the Technical Units within the Department.

4.1.2 Staffing

At the end of 1992, only twelve (12) of the thirty one (31) approved positions (Project Staff not included) for the Department were occupied in the following manner: two (2) of nine (9) professionals; five (5) of twelve (12) sub-professionals; and five (5) of ten (10) administrative, clerical and support staff. In Regions 2,4,5, and 6, out of ten (1 professional and 9 sub-professionals) staff positions only four (4) were occupied.

The Department needs to have at least six (6) professionals, eight (8) sub-professionals and nine (9) administrative, clerical and support staff in place at the Centre and all the staff in place in the Regions for it to plan and implement its annual current and capital programmes with any level of efficiency.

4.1.3 Institutional Strengthening

For the Department to effectively carry out its functions it must be effectively staffed, trained, equipped, housed and transported.

Staff would have to be recruited and trained in the following areas:

- Resource Assessment
- Fisheries Management
- Fisheries Economics
- Fisheries Statistics
- Fisheries Extension
- Fisheries Technology (Gear and Post Harvest)
- Aquaculture and related fields,
- Marketing and Quality Control.

The training provided under CFRAMP is likely to be quite limited in light of the budget allocated for this Sub-project and which has to meet some of the training needs of the other participating countries as well. However, the Department's inability to attract staff due to low salaries is affecting its participation in this programme.

At present, the Department is inadequately equipped and housed. A building with the following should be provided:

- Adequate office space
- Library facilities
- Laboratory facilities
- Data Management facilities.

Some data management equipment (computers and software) is being provided by CFRAMP. FTAP will also provide some equipment when it comes on stream.

Field staff need to have adequate means of transport in order to conduct extension, data collection and enforcement activities. A few motorcycles are likely to be provided under CFRAMP to facilitate data collection.

5.0 Conclusion

The Fisheries Sub-sector can improve on a sustainable basis its contribution to the GDP; foreign exchange earnings; nutritional requirements of the population; creation of employment; and improvement of incomes for participants so long as there is an integrated approach to resource management and development of the Marine Fishery and the Inland Fishery. It must be recognised that increased contributions will not result from the overexploitation of any one fishery but by rational management and development of each fishery depending on the set objectives which would result in an accumulation of sustainable benefits. Also, the need for effective surveillance and enforcement must be recognised if the objectives for development are to be achieved. The success of the resource management and development process will rest on the ability to develop and maintain accurate databases (biological, economical, social, environmental). These will have to be established to provide information for decision making and to keep the private and public sectors well informed.

In the short term the contribution of Aquaculture can be improved on by way of a commercial joint venture utilising highly marketable species, but a sustained contribution from Aquaculture to the GDP, etc. will depend on the planning and effective implementation of a medium to long term Aquaculture Development Programme.

The importance of the contribution of a properly staffed, trained and equipped Fisheries Department to the overall development process must not be overlooked.

MARKETING AGRICULTURAL PRODUCTS OF GUYANA

By: A. Daw, Deputy General Manager
Guyana Marketing Corporation

1. INTRODUCTION

1.1 Background on Marketing and Marketing Institutions and Projects

For over half a century there has been little change in the range of major crops grown consistently for export. These have been Sugar Cane, Rice and fresh fruit and vegetables to a lesser extent. Sugar Cane and Rice continue at the top of the list, primarily because the production of these commodities has been linked to specific export markets. The institutional structures in place for these two traditional crops have ensured over the years that issues related to research, training, transportation, financing and input supply were appropriately addressed.

The marketing system for non-traditional agricultural crops, (fresh agricultural produce other than sugar and rice) has been only partly developed over the years. Direct support for farmers and private market intermediaries has been minimal and, in general ineffective. Government's answer to the diverse marketing problems of domestic food crops was the establishment of the Guyana Marketing Corporation (GMC) in 1962. The Units which the GMC took over at that time included the Ham and Bacon Factory, the Fish Marketing Centre, the Processing Factory, the Milk Pasteurisation Plant and Produce Depots.

In addition to trying to make these "businesses" profitable, the GMC had to deal with a multiplicity of highly perishable products of variable quality which were geographically dispersed and in the hands of a large number of small producers. Inadequate transportation, storage, packaging and communication always ranked among the most critical marketing constraints. The Corporation battled unsuccessfully with the task of carrying out its complex functions and millions of dollars were lost in the process.

Despite this situation, Government continued to feel the need for a central marketing organisation as farmers and other market participants continued to seek assistance in the marketing of their produce. It was in recognition of this need that in the early 80's the Government implemented an IDB assisted Food Crop Production/Marketing Programme (GY-002). The overall objective of this programme was to increase the production and productivity of food crops and improve their marketing.

The Programme consisted of two sub-programmes, credit and infrastructure. The latter provided six fully equipped rural marketing and extension centres for storage and the disbursement of credit. It was conceived initially that GMC would collaborate with the Ministry of Agriculture and GAIBANK to provide all services related to marketing of produce, however, the GMC was structurally incapable of assuming this role.

1.2 Present Institutional Structure of the Guyana Marketing Corporation

The negative experiences and high costs of the first GMC forced Government to rethink its marketing strategy. It became convinced that several of the marketing activities would be better conducted by private entrepreneurs.

The "New" GMC emerged in late 1985, charged with the responsibility of improving the competitiveness of the marketing system by facilitating access to potential participants willing to provide marketing services. Since 1985 it has been engaged in: (a) distributing better price and related information for consumers, producers and marketing agents, (b) analyzing trends in wholesale and retail food prices and farm retail spreads, (c) providing market extension services, (d) offering advisory and brokerage services, (e) conducting market research, (f) advising on market policies, and (g) instigating better grading and improved packaging and storage; thus addressing the issue of losses due to post harvest handling.

In general the "New" GMC functions in a facilitating cum co-ordinating role with respect to both the domestic and overseas markets. The roles of farmers, hucksters and other market participants, as they currently operate, have been recognised and the "New" GMC can be said to be assisting indirectly in the organisation and better distribution of fresh agricultural produce both on the domestic and export markets.

1.3 Rural Marketing Centres

The six Rural Marketing Centres (RMC) were completed in 1983 under the IDB funded project. The six large buildings were intended as distribution points for scarce commodities, and farm inputs and as collection points for farm produce to be marketed on behalf of farmers. Road and water transport were also provided under this programme. It was intended that these transport facilities would convey produce to Georgetown for the domestic market or export. Except in the case of the Mibikuri centre, all centres have failed to fulfill expectations.

The marketing centres were intended to be economic projects to provide funds for the regions' operations. As such, except in the case of Black Bush Polder, the centres had little control over the funds generated. Also, the trading programmes of the centres were all seriously affected by the devaluations of the Guyana dollar and the freeing up of the market economy. They have not been able to compete with private operators who carry large inventories while conducting their business alongside the centres themselves.

The Centres at Parika, Supenaam, Charity and Kumaka all appear ideally situated for transformation into commercial trading centres where, by subdivision of the buildings, areas could be rented to wholesalers for trading, storage and preparation for shipping by sea or by road. In addition, RMC's at Parika and Supenaam occupy large level tarmac sites where stalls for retailers could be established to the relief of the stelling and road side congestion at Parika and improved conditions at Supenaam.

2. PRESENT SITUATION AND PROBLEMS

2.1 Domestic Marketing

2.1.1 Overview of the marketing system.

With the exception of peanuts in the Rupununi, and cereals and legumes on the internal savannahs, virtually all production of non-traditional crops takes place along the narrow coastal plain. Table 1 indicates the relative importance of the various non-traditional crops. As shown, the production of fruits and vegetables is greatest in Regions I to VI which encompass the coastal area from the North West, bounded by the Venezuela border and the estuary of the Waini river, to the Berbice area (Southeast) bounded by the Corentyne river which defines the border with Suriname (Map 1). Regions 2, 3 and 4 are major citrus producers, pineapple is principally grown in Region 3 and Regions 3, 4, 5 and 6 predominate in the production of vegetables. Carambola is mainly produced in Region 2 while peanuts are the main crop in Region 9 but are also grown in regions 1, 4 and 10.

This degree of specialization results in the transfer of considerable quantities of produce from one end of the coastal strip to the other. Significant quantities of produce are transported to some inland centres of population such as Linden and Bartica whose main activity is mining.

2.1.2 Identification of key participants and their roles.

The marketing of non-traditional agricultural crops is largely in private hands. A part of the production of food crops moves directly from farm to consumers in local communities. However, the major portion goes through a more formalized system that moves products from distant farming communities to urban centres at Georgetown, New Amsterdam, Corriverton and Linden. The system is fairly efficient, providing all the functions required to deliver products from farmers to consumers. These include operations at assembly points in farming areas; transportation systems for moving products by land or water; wholesaling and distribution; in some cases processing; storage, and ultimately retailing. The majority of the participants in the marketing system are women. They dominate the wholesaling and retailing activities along the coastal belt. The principal functions carried out by women include: (1) purchasing, assembling and preparing produce. (2) wholesaling/retailing produce at Secondary and terminal market points.

Figure 1. shows the marketing channels followed by most non-traditional food crops and the types of participants involved. In general, it can be said that the marketing channels identified have evolved over time in response to the needs of consumers within the context of the layout of Guyana's coastland and the available marketing infrastructure.

Table 1: PRODUCTION OF CROPS OTHER THAN RICE & SUGAR BY REGIONS: 1992

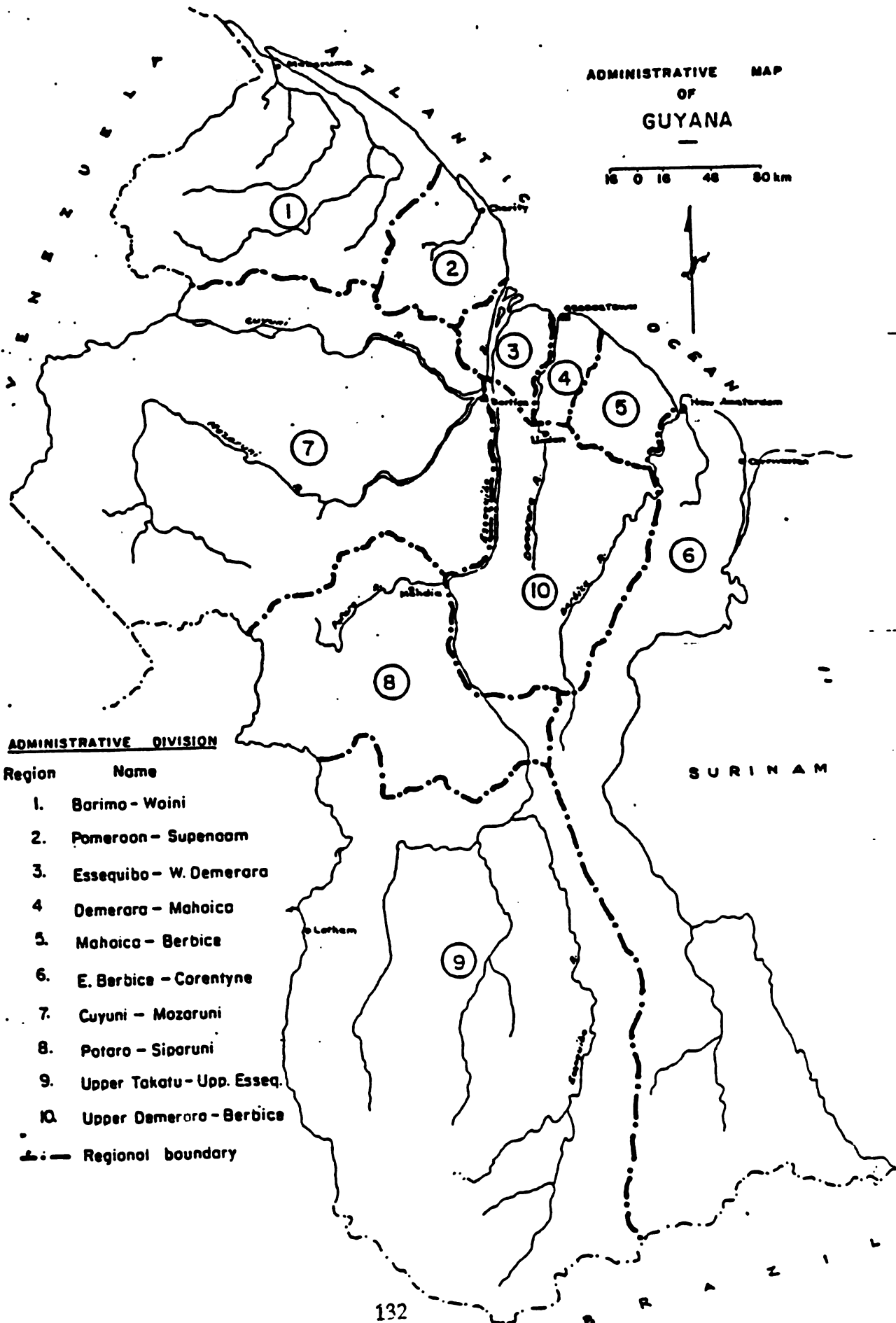
CROP	UNIT	REGION										TOTAL									
		1	2	3	4	5	6	7	8	9	10										
Cereals & Legumes:																					
- Corn	000lb	1,495.0	300.0	175.3	3.0	20.5	84.2	25.0	95.0	245.0	4,650.0	7,093.0									
- Blackeye	000lb	18.5	185.0	23.5	8.8	36.5	149.1	1.5	8.5	4.5	525.0	960.9									
- Minica	000lb	1.7	2.5	10.5	108.3	77.3	207.6	0.0	3.5	3.7	0.0	415.1									
- Other Legumes	000lb	4.9	0.0	25.3	65.2	3.5	-	4.9	28.5	0.0	445.3	577.6									
Oils & Fats:																					
- Peanut	000lb	1,050.0	150.0	11.0	336.0	23.3	5.0	10.6	10.0	165.3	2,125.0	3,888.9									
- Coconut	000lb	6,050.0	21,150.0	7,125.0	1,072.1	9,575.3	10,590.0	0.0	0.0	0.0	750.0	56,312.4									
Roots & Tubers:																					
- Cassava (S & B)	000lb	20,870.0	1,550.0	9,250.0	4,307.5	175.0	1,224.4	670.0	17,600.0	10,050.0	2,125.0	67,822.1									
- Eddoes	000lb	3,645.0	615.3	12,250.0	960.0	107.5	1,146.0		475.0			19,198.8									
- Yam	000lb	4,780.0	145.0	810.0	138.0							5,873.0									
- Tannia	000lb	170.0	0.0	95.0	10.5			625.0				275.5									
- Sweet Potato	000lb	1,100.0	310.0	1,115.0	187.5	122.3	696.0		95.0	210.0	315.0	4,056.1									
- Plantain	000lb		1,850.0	20,518.0	1,806.0	520.6	3,216.0			75.0		28,705.6									
Fruits:																					
- Banana	000lb		2,650.0	20,255.0	1,444.0	750.0	4,142.5		15.3	95.0		28,351.8									
- Lime	000lb		190.0	1,160.0		424.3	1,032.5					2,807.1									
- Grapefruit	000lb		350.0	552.0		35.0	93.4					1,031.0									
- Orange	000lb		2,000.0	5,450.0	375.0	534.3	1,546.8					9,531.1									
- Other Citrus	000lb	905.0	0.0	730.0		164.5	350.0					2,524.5									
- Citrus Sub Total	000lb	905.0	2,540.9	7,892.0	375.0	1,158.1	3,022.7					15,893.7									
- Pineapple	000lb		680.0	18,000.0	425.0		362.5					1,595.0									
- Pear (Avacado)	000lb	250.0	650.0	675.0	20.0	-						6,095.6									
- Carambola	000lb		5,945.6	150.0		-						3,780.0									
- Watermelon	000lb			500.0	72.0	785.5	2,422.5	560.0				4,204.5									
- Other Fruits	000lb	450.0	500.0	725.0	1,430.5	539.0															

Table 1 Continued

CROP	UNIT	REGION										TOTAL
		1	2	3	4	5	6	7	8	9	10	
Vegetables:												
- Carrot	0001b			12.0	210.0	510.8	2,241.8		16.5	15.5	20.0	64.0
- Tomato	0001b			630.0	62.0	315.3	2,182.5		0.7			3,593.3
- Cabbage	0001b			400.0	174.0	326.0	3,230.0					2,959.8
- Pumpkin	0001b		1,600.0	3,462.0	761.0	431.5	2,395.0	215.0				9,007.0
- Bora	0001b		250.0	2,100.0	361.0	264.7	2,675.0	90.0				5,777.5
- Ochro	0001b		120.0		446.0	229.8	3,296.0	20.0				3,320.7
- Boulanger	0001b			1,820.0	551.8	250.3	970.0	30.0				5,821.8
- Squash	0001b			275.0	520.0	550.0	340.0	1,500.0				2,047.1
- Cucumber	0001b			650.0	999.3	2,150.0	975.0					2,310.0
Other Vegetables:	0001b	250.0		950.0					12.5	75.0		7,031.8
- Eschallot	0001b			168.0	171.0	850.9	462.5					1,652.4
- Hot Pepper	0001b			340.0	494.2	275.6	2,280.0					3,389.8
- Ginger	0001b	1,150.0		80.0								1,230.0
- Turmeric	0001b	1,200.0			14.0	15.5						1,200.0
- Other Spices	0001b			14.0								43.5

Source: Ministry of Agriculture

MAP 1: THE POLITICAL REGIONS OF GUYANA



ADMINISTRATIVE DIVISION

Region	Name
1.	Barima - Waini
2.	Pomeroon - Supenaam
3.	Essequibo - W. Demerara
4.	Demerara - Mahoica
5.	Mahoica - Berbice
6.	E. Berbice - Corentyne
7.	Cuyuni - Mazaruni
8.	Potaro - Siparuni
9.	Upper Takutu - Upp. Esseq.
10.	Upper Demerara - Berbice

--- Regional boundary

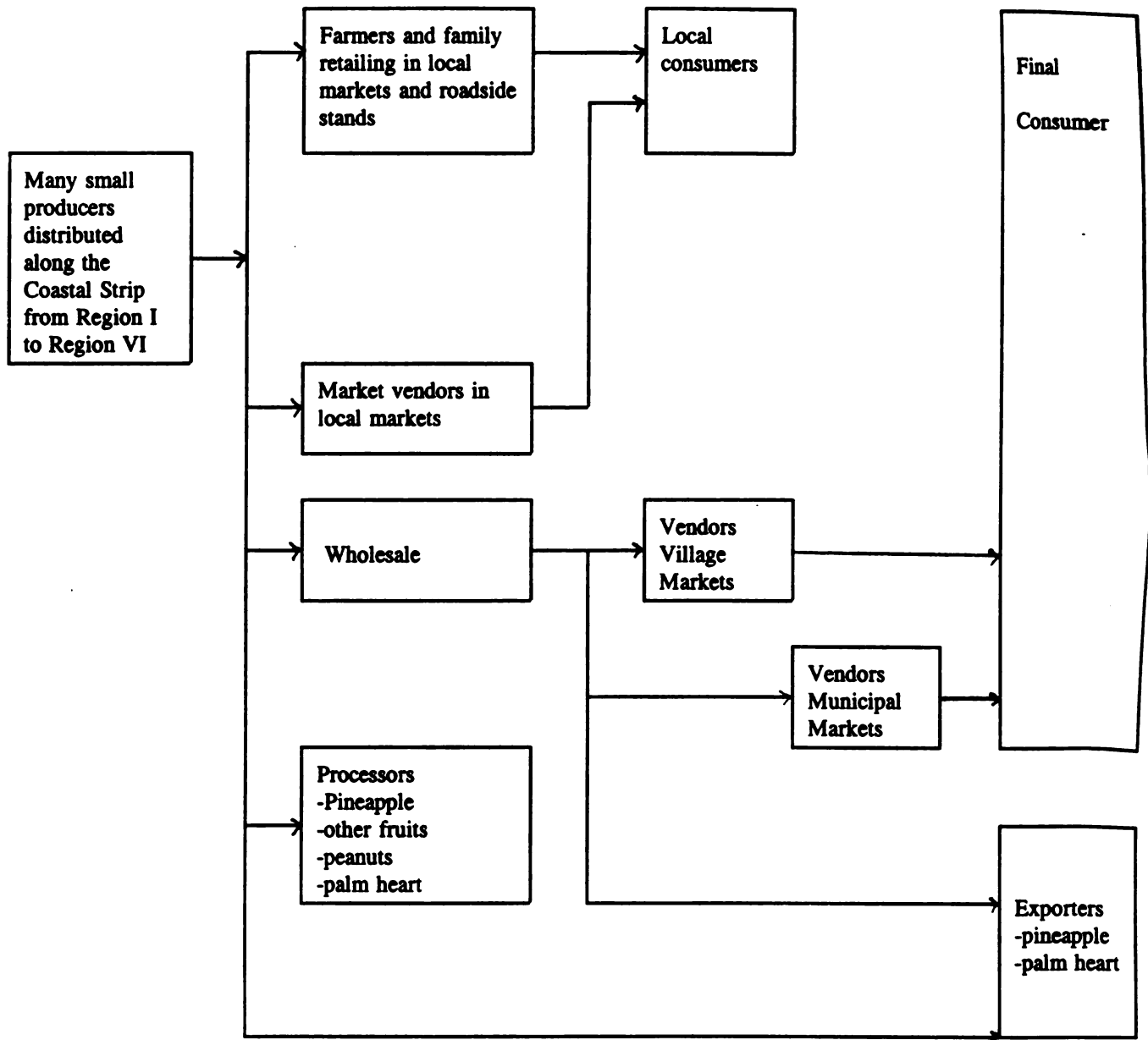


Figure 1: Traditional Marketing Channels for the Marketing of Non-Traditional Food Crops and Key Participants

Source: New GMC/IICA

2.1.3 Marketing Infrastructure

A very large proportion of the food crops passing through the marketing system are consumed soon after harvest in the fresh form. Many of these products are seasonal. There are very few storage and processing facilities. This constrains the seasonal availability of food crops and limits the time that products can be held during the peak season. This problem is more pronounced with respect to vegetables and fruits than with root crops, pumpkins and plantains which are produced throughout most of the year.

The local marketing system (Figure 1) is a simple one in which farmers sell their produce for cash directly to consumers in their communities. Sales are also made from roadside stands and roadside markets. Most of the roadside markets are located at points contiguous to other important agricultural activities, viz sugarcane estates. Accordingly, market days coincide with "paydays".

In areas served by roads, an increasing volume of produce is transported to market by truck, otherwise, movement of produce to market points is done by small boats.

The concentration points include wholesale and retail activities. In some cases the functions are not differentiated since they may be conducted simultaneously by the same person. The major assembly points for all types of farm products are located along the coastal belt with a few located along the rivers in the interior areas. These include stellings/wharves at Kumaka (Region 1); Charity, Riverstown, Adventure, Leguan, Hogg Island, Wakenaam and Supenaam (Region 2); Parika (Region 3); Timehri and Mahaica (Region 4); Mahaicony (Region 5), and Skeldon (Region 6).

The distribution of market places by Region is shown in Table 2. The system along Guyana's coast is essentially characterised by 31 covered markets and 22 roadside markets operated by the municipalities or Local Government administration. Another 15 roadside markets do not benefit from a formal administration. The six Rural Marketing Centres are operated by the Regional Authorities. A very significant quantity of produce moves through the farmer/wholesaler/retailer channel to the consumer. The vast majority of the produce is distributed through two Georgetown locations (Stabroek and Bourda Markets) often for re-distribution.

Table 2: Number of Market Places by Type and Region

Region	Rural Marketing Centres	Covered Markets	Roadside Markets
I	1	-	1
II	2	2	2
III	1	2	8
IV	1	14+	15
V	0	1	3
VI	1	10	8
X	-	2	-
Total	6	31	37

Source: Market Intelligence Unit (MIU) "New" GMC

2.1.4 Transportation Systems

The majority of fruits, vegetables and root crops produced in the Regions along the coastal plain is channelled into Georgetown by truck and by boat for sale and distribution to the local populace. Thirty-two percent (32%) of the total population (about 242,000 persons) live in Georgetown and its environs. In addition, Georgetown acts as a re-distribution centre for markets situated along the East Coast-Demerara, East Bank, Demerara, Linden and to other areas which vary with the commodity. Georgetown has five municipal markets, namely: Stabroek, Bourda, Kitty, La Penitence/Albouystown and East La Penitence.

To the East of Georgetown is the Georgetown - Rosignol link (68 mls) which is a good hard surfaced highway with no ferry crossings. Rosignol Village gives way to the Berbice River which has a regular ferry service which can transport up to thirty vehicles including 10-ton trucks without difficulty. On the other side of the Berbice River is the town of New Amsterdam from which one can drive 48 mls comfortably along the New Amsterdam/Crabwood Creek Highway.

Immediately West of Georgetown is the Demerara River which has a pontoon bridge in very poor condition. Its service is frequently disrupted. The Georgetown/Parika link is a well-surfaced, properly maintained highway which is approximately 30 mls long.

Parika is on the East Bank of the Essequibo River, the largest of the three major rivers. This is the most difficult and time-consuming crossing. The Essequibo River crossing from Parika gives way to Adventure, from which the Supenaam/Adventure/Charity road leads 38 miles. This road has been in a bad state of repair for several years but a two year contract for its repair has just been let to a Brazilian Company.

The handling of fresh produce at all assembly points is done by manual labour. Around the market, produce is also moved manually or by hand trucks and small "push" carts. Larger horse drawn carts, small vans and lorries are employed to provide intra-market transport. There are no scales other than those provided by individual buyers and sellers. Accordingly the volumes of produce entering the market are all estimates.

2.1.5 Wholesaling Activities

Stabroek and Bourda marketing in Georgetown are the main points for the receipt of produce from the outlying production areas. Both markets have a long history that date back about 100 years. The original Stabroek Market, for example, was declared open by Governor Kortright in 1881. Though there have been modest extensions, these have not really kept pace with the growth of Georgetown and other developments in the country.

On specified days there is major wholesaling of commodities. Wholesaling at both markets is usually done early in the morning or late in the afternoon, or during the night on a daily basis, depending on the points of origin of the produce. For example, the wholesaling of produce originating from the Essequibo Coast and Islands is usually done at Stabroek Market on Monday mornings and that from the Pomeroon River, on Fridays.

On the southern side of the Stabroek Market, produce transported by trucks and vans is wholesaled. The area utilised is also used as a thoroughfare for vehicles. It is also the only point of entry to and exit from the Georgetown ferry stelling. This results in a lot of activity in the area and during wholesaling hours the parked trucks and vans contribute to congestion and confusion.

The wharf area, which is an extension of the Stabroek Market, is a major wholesaling point for produce brought by boat from various areas. The wharf also provides short-term storage for the less perishable commodities such as pumpkins, green bananas, root crops and coconuts.

Bourda Market, on the other hand, receives produce mainly by road from Black Bush Polder, West Coast Berbice, Mahaica and other villages along the East Coast Demerara. Wholesaling activities are done from any of the four streets around the market. On Wednesdays/Thursdays these activities take place on an old skating-rink just north-east of the municipal market.

There is no distinct wholesale market in Georgetown. Both wholesale and retail activities take place in close proximity and in some instances, simultaneously.

The absence of regulations governing wholesaling activity in Georgetown and areas designated for wholesaling activities only, are, perhaps, the main reasons for the confusion within the two main markets. However, there is no absence of wholesaling activity and entrepreneurship.

2.1.6 Marketing Credit

Agricultural credit to producers of non-traditional agricultural produce (fresh fruits and vegetables) is channelled through a few lenders. Among formal lenders are public institutions comprising banks and cooperative societies. The major informal source of credit is the middleman (huckster). According to GAIBANK the share of agriculture in commercial lending has remained below 10%.

The agriculture sector had, at one time, enjoyed subsidized rates of interest through GAIBANK which provided loans below the prime rate. The present lending rate (August 1993) is 17.5% compared with 19% offered in March 1993.

GAIBANK's procedure for agricultural loans requires that a farm plan or a project document be prepared. This is then appraised. The procedures are complicated and lengthy and has served to discourage small farmers especially. Meanwhile, GAIBANK has been affected by an increased number of loan defaults and payments arrears. One of the reasons advanced for the poor performance is that of poor marketing arrangements for farmers produce.

The Institute of Private Enterprise Development (IPED) also lends to producers and the disbursement rate is much faster.

2.1.7 Products of Greater Demand

The Market Intelligence Unit (MIU) of the GMC has been monitoring the current purchasing habits of local consumers. According to the MIU, within the fresh fruit category the banana is of greatest demand followed by orange and watermelon. The demand for other fruits such as sapodilla, mango, avocado and papaw (all generally considered expensive), was relatively poor. However, mango and avocado are in high demand when in season (and prices are lower).

In the vegetable category, bora was by far the most popular of the weekly basket mix. Bora was followed by pumpkin and boulangier.

There is also a high demand for seasonings. The major types are hot peppers, eschallot, celery and thyme.

In the root crops and plantains category, cassava and eddo are in greatest demand, followed by plantain. Yam has been displaced by white potato.

Split pea is the most selected item within the peas and beans category. This item is being imported.

2.1.8 Relationship between Producers and Wholesalers

There is a strong element of mistrust between farmers and the middlemen (hucksters). The prices offered by the latter are usually much lower than that being sought in the market place. This is particularly the case with produce from the distant riverain areas. Farmers react by including extraneous material in the bags along with the produce. Some even resort to wetting the bags before arriving at the assembly points so as to gain weight from the "unsuspecting" traders. Most traders use the credit system for produce and will only pay the farmer for the final weight of the produce after it has been sold. Nevertheless, some Middlemen have been able to build strong relationships with producers and often receive consignments without having to be physically present at an assembly point.

2.2 Export Marketing

2.2.1 Overview of the marketing system

The export trade involves a wide range of fruits and vegetables, spices and condiments. Major destinations are the CARICOM and North American countries, (New York, and Toronto) and France. The major commodities exported in terms of volumes are Heart of Palm, Pineapple and Pineapple products, Plantains and Citrus (limes).

The export volume of non-traditional agricultural produce was very low prior to 1985 when the New NGMC emerged with a mandate to "facilitate and co-ordinate the exportation of non-traditional agricultural commodities." Since 1985 the volume of exports has moved from below 200 tonnes to over 2000 tonnes in 1991. The US\$ value of the trade also improved from US\$0.09M in 1986 to US\$1.22M in 1991. For 1992, the volume of non-traditional exports was 1902 tonnes. This figure was 13% below the 1991 level of 2187 tonnes. The G\$ value of these exports was also slightly (9%) below the 1991 figure, falling from G\$136M (US\$1.22M) in 1991 to G\$128M (US\$1.0M) in 1992 (Table 3).

Some eighty commodities have entered the trade but with the exception of palm heart and pineapple volumes are very small. Produce is usually assembled, cleaned, graded and packed in open spaces below the homes of exporters or one small privately owned packhouse in Georgetown.

Exportable produce is selected from loads grown for the local market. It is then cleaned, graded and packed. Some exporters use standard corrugated cartons while others use substandard packaging including bags. Exporters take the responsibility for getting the produce to the export points. There they are checked by officers of the Plant Quarantine Division and the Customs and Excise Department prior to loading.

Table 3: Export Volumes and Value of Non-Traditional Produce, 1986-1991

YEAR	1986	1987	1988	1989	1990	1991	1992
Volume (MT)	359	840	1338	1066	1205	2187	1902
Value (G\$M)	1.1	3.4	11.0	7.6	14.6	135.7	128.0
(Estimated) (US\$M)	0.09	0.07	0.17	0.12	0.12	1.22	1.0

Source: Guyana Marketing Corporation, Annual Reports

2.2.2 Identification of key participants

The export trade has been carried mainly by 13 itinerant small traders moving fresh produce into the Regional markets, especially Trinidad and Barbados. Guyana has also penetrated the ethnic markets of North America and Europe on a very small scale. Produce is assembled by the exporters themselves or their agents or helpers. Corrugated packaging is being sold by Seals and Packaging Industries Ltd. (SAPIL). A waiver of the 30% consumptions tax on packaging material may be obtained through the GMC.

A local body the "Association of Non-traditional Exporters of Guyana (ANTEG)" comprises exporters of a wide range of agro-food commodities. This organisation has been very effective as a lobby group for participants engaged in the trade.

The GMC provides technical and advisory support to producers and exporters alike and also monitors the trade.

2.2.3 Infrastructure for Export Marketing

The majority of exporters sell directly to distributors or processing firms in the importing countries. Payment is normally made through the banking systems.

Most exporters take the responsibility of supplying produce up to the local points of export. Buyers are encouraged to pay the freight costs thereby taking a stake in the cost of getting the produce and reducing the financial funding on the exporters. The problems faced by the local exporters include; (a) difficulties with obtaining high quality produce, (b) lack of fully equipped transport facilities, (c) lack of cold/chill storage facilities at the

ports, and (d) difficulties with on-line arrangements especially for cargo being transhipped in Trinidad or Barbados. Cold/chill storage for producers being transshipped is available at Barbados airport but not so in Trinidad.

As shown in Table 4, between 1986 - 1991 the number of countries receiving non-traditional agricultural produce from Guyana increased from 5 to 13. However, only eight of these have been trading consistently with Guyana.

The most popular markets in order of importance are France, Trinidad, Barbados, Toronto and New York.

Table 4: Non-Traditional Agricultural Produce Exports 1986-1991 Total Export Volumes by Country

COUNTRY	1986	1987	1988	1989	1990	1991
Barbados	241.4	631.2	925.4	965.51	365.02	406.89
Trinidad	5.4	174.0	189.9	42.05	616.31	798.81
USA	4.1	3.0	2.0	17.10	22.30	47.53
St. Vincent	-	7.0	-	0.23	-	-
United Kingdom	8.1	0.2	233.8	1.42	0.08	74.68
Holland	-	31.1	0.02	-	4.55	51.24
Antigua	-	-	6.59	2.77	-	-
Suriname	-	-	0.01	0.05	-	1.64
St. Lucia	0.2	-	0.05	-	-	-
Hawaii	1	-	0.1	-	-	-
Canada	0.1	-	4.00	31.69	10.29	21.14
Jamaica	-	-	-	0.34	-	0.01
West Germany	-	-	-	0.45	1.34	0.15
St. Kitts	-	-	-	0.40	-	-
Grenada	-	-	-	-	0.20	0.05
Japan	-	-	-	-	180.31	48.32
France	-	-	-	-	-	743.00
Martinique	-	-	-	-	-	0.78
Total	359.3	840.2	1,337.77	1,066.45	1,204.75	2,187.45

2.2.4 Transportation Systems

Air Freight

Florida West Airlines runs a weekly return service from Miami and Barbados to Guyana. This cargo-only carrier is operated by Laparkan. The aircraft being operated is a Boeing 707 which because of its age could be expensive to maintain. Florida West Airlines has been maintaining its schedule and Laparkan is eager to extend its network to destinations including Cayenne, Trinidad and New York. It is, however, unwilling to proceed with its plan until such time when it can have access to proper storage facilities which it hopes to build at the Timehri Airport.

At the present time the Florida West Airlines moves large quantities of frozen marine foods. However, larger markets exist for fresh fruit, vegetables and fish on ice. The Airline has been facilitating transshipment onto Canada via Barbados. Laparkan provides its own ground handling and storage services.

Sea Carriers

Small schooners are the main carriers of fresh produce to Trinidad. This journey normally takes between 36 to 48 hours and landings are effected at the CARICOM jetty. The majority of fresh produce to other CARICOM and North American countries is moved by air. Produce bound for the UK and European markets have been moved both by air and by sea. However, whereas air shipments can be completed within two days, sea shipments take between fourteen to eighteen days.

2.2.5 Marketing Credit

The export traders have no access to formal sources of credit. As such they either utilise their own savings or obtain loans from informal sources such as money lenders, relatives or friends. The traders usually seek out their own markets and sometimes travel with the shipments. The risk is high and many traders have been forced to get out of the trade following losses suffered after one or two unsuccessful shipments.

The reasons associated with these losses are:

- a) difficulty in providing quality produce to the overseas markets on a regular basis.
- b) delays in payment by buyers or buying making non-payments, and
- c) produce losses not covered by market insurance.

2.2.6 Exports by Type Crop

Some distinct changes in the export trade have been identified over the past three years (1990-92).

- (1) Larger quantities of a variety of fruits and vegetables are being exported to the North American markets in New York and Toronto.
- (2) Fresh pineapple shipments into Barbados and Trinidad have decreased and those going to Suriname are not accounted for.
- (3) Exporters have been shipping more limes than oranges into Barbados.
- (4) The volumes of plantains going to Trinidad have fluctuated.
- (5) Only spot shipments of coconuts, coffee beans and pumpkins are being made.
- (6) The shipments of pumpkins to the UK, W.I cherries to Japan, coffee beans, ginger and tumeric to Venezuela (through the underground trade) have ceased.
- (7) The volume of processed commodities such as heart of palm, jams/jellies, pineapple chunks and coconut shell powder have all increased.

In 1991 a short list of commodities was made following discussions between the Ministry of Agriculture and the GMC. The commodities were to be given production priority for export. These commodities were chosen because (a) they were easy to grow and (b) they were easy to market. The list included:

Bora	Citrus (lime, orange, grapefruit)
Pepper	WI Cherry
Plantain	Coconuts
Pineapple	Passion Fruit
Pumpkin	Cassava

The commodities which have been exported consistently are listed below in two categories (a) Fresh and (b) Processed

<u>FRESH COMMODITIES</u>	<u>PROCESSED COMMODITIES</u>
Pineapple	Heart of Palm
Lime	Pineapple chunks
Bora	Coconut shell powder
Boulangier	Pineapple jam
Hot Pepper	Guava jelly
Plantain	
Eddo	

During 1986-1992 pineapple remained as the commodity which has been traded most consistently. Pineapple is followed by plantain and bora. The most popular processed commodities are Heart of Palm and Pineapple chunks. Interest has also been shown in sourcing coconut shell powder, pepper sauce and jam/jellies, rice, carambola fruit, carambola juice, copra and coconuts.

2.3 Priority problems and needs

2.3.1 Domestic Marketing

An important constraint to both domestic and export marketing is that virtually all produce has to pass through Georgetown and/or Parika.

This means that production from the Eastern part of the country must cross the Berbice river and that from the West must cross the Essequibo or be shipped from the North West (Region 1) to Georgetown. The ferry services provided by a small fleet of vessels sailing from old wharves are uncomfortable and unreliable. These wharves, at which travellers are obliged to queue for hours in advance of a boat's departure, lack modern equipment and decent amenities while the costs in ferry fares are relatively low, the costs in time are incalculable. A two hour trip can sometimes take one-two days as a result of breakdowns or being stranded on sand bars.

There are many small boats with outboard engines which ferry passengers and goods across the Essequibo and to and from the islands but these cannot carry vehicles, neither can the schooners which make the crossing to Parika/Georgetown.

In Georgetown itself, the markets at Stabroek and Bourda are in need of renovations and are no longer operating efficiently in the context of modern city traffic conditions. This situation continues to worsen as imports of vehicles increase with a relaxation of foreign exchange restrictions. The wholesaling and retailing functions are undifferentiated. This has caused much confusion especially for the sellers.

The Urban conurbation of Georgetown is expanding. The population increase is particularly obvious in Georgetown suburban areas and villages along the East Coast and on the West Coast Demerara. Some improvement to market facilities took place in the 1960 - 70's to serve this extending population but the facilities are no longer adequate.

Markets and marketing activities in rural areas have also expanded in size and character and most of the facilities are in need of improvement.

The major problems facing crop farmers are poor post-harvest handling and inadequate transportation and storage facilities. The public boat service which transports food crops and other products from the riverain areas such as the Pomeroon, North West district and

Berbice rivers have been out of operation for a long while and the cost of private transport is very high. These factors have contributed to a decline in the food crop production in the riverain areas and an increase dependence on supplies from areas on the coastal belt.

There are periodic gluts, especially of fruits and vegetables, but the volumes of these increases are not enough to sustain processing over long periods. Besides this, the 30% consumption tax on processed agricultural products is a discouragement to the establishment of such industries.

2.3.2 Export Marketing

There are a number of constraints impacting export marketing. These emanate from: (a) the lack of adequate market intelligence and information, for effective decision making, (b) logistical problems with acquiring payloads of quality produce, (c) an irregular and insufficient supply of available crops and (d) the competitive disadvantage of marketing quality produce in larger markets.

The cargo facilities at Timehri airport are already a constraint to exports, although accessibility to freight space is now more accessible. Currently there is only one cargo-dedicated carrier (Florida West Airlines). However, it only services the Guyana/Barbados/Miami route once weekly. Two other passenger carriers, BWIA and GAC, offer limited cargo space into Trinidad, Antigua, Barbados, New York and Miami.

Other impediments to exports are the uncertain telephone and facsimile services; the lack of Customs clearance facilities in the interior, for example, Charity on the Essequibo Coast and Kumaka in the North West District, and all export documentation is centralised in Georgetown.

The International Market situation shows that whereas there is a vast market for most fresh produce, the market for new suppliers is limited due to intensive international competition.

The market for new independent suppliers from Guyana may even be non-existent due to the many constraints identified above. Having said this, how should Guyana address the current situation? The answer may lie in one of the following strategies:

- a) Concentrate on small niche markets which can be supplied on a regular basis
- b) Select a few commodities which have the best export potential and encourage scale production of these by reliable producers.
- c) Encourage the expansion of independent exporters within CARICOM and the wider Caribbean .

- d) Market produce through already established expatriate exporters or exporters based in Trinidad, Venezuela, Suriname or other CARICOM countries.
- e) Market produce directly through a major importer/exporter (independent or multinational) of fresh or processed commodities, e.g. Grace Kennedy Ltd.

[Note in the case of (d) and (e) the importer/exporter should be encouraged to participate in the provision of inputs, transportation, packaging and technical assistance].

The priority constraints to the export thrust are:

1. Difficulties with guaranteeing sustainable shipments of quality produce to overseas customers.
2. The absence of a surveillance service to enforce quality standards for fresh produce.
3. A shortage of direct transport links to important target markets.
4. Poor facilities and equipment for handling and storing fresh produce especially at the ports.
5. Uncertainty with regards to payments by overseas buyers.
6. Non existence of suitable laboratory facilities for pesticide residue analyses on fresh produce.
7. The absence of short-term financing and insurance for agro food export sector.
8. A depleted and inexperienced agricultural extension service.
9. Inexperience with trading with international markets.

3.0 PROPOSED SOLUTIONS

3.1 Policy

Government should move swiftly to improve its current air and sea linkages with the rest of the trading world since volume exported is a function of affordable, reliable and available means of transportation.

Government must alumbate its policy for the non-traditional agro-food sub-sector so that all participants have a clear understanding of the direction in which the country is moving and the rules of the "game".

3.2 Projects and Actions

1. The following project ideas and actions should be considered for development:

1. Construction of an freight cargo handling shed at Timehri Airport which will satisfy the needs of Guyana for its fruits and vegetable export arrangements. Laparkan has been granted permission to construct such a facility at Timehri. Suggested criteria upon which the design of the facilities are based should include:
 - (a) A satisfactory phytosanitary and quality inspection point. This would enable Guyana to guarantee the quality of its produce and thus avoid import bans such as that on citrus from Guyana by Barbados which occurred in 1986.
 - (b) Similarly, a satisfactory customs inspection point. Joint inspection to satisfy Customs and Excise requirement as well as quality standards would avoid double handling and repacking.
 - (c) Improved security.

The benefits to be accrued from the presence of such a facility would include:

- (a) Shelter from rain and sun for produce awaiting shipment, with a part of the storage air conditioned for the perishable commodities.
 - (b) Space to carry out primary pre-packaging and grading functions.
 - (c) Inspection/reception area and office space for phytosanitary quality inspectorate and Customs and Excise officers.
 - (d) Security arrangements to protect the produce and eliminate risk of tampering (adding drugs).
2. The Georgetown council and the local authorities of those villages which comprise the Georgetown Conurbation should request a comprehensive study of the fruit and vegetable trade with a view to providing satisfactory trading and shipping facilities.

3. An FAO funded project aimed at focusing on the development of processing at the cottage level is in the pipeline. This sub-project was conceptualised under the project "Strengthening the marketing services of the GMC" (Guy/003).
4. Market research of North American and European markets should be conducted (as it relates to exporting selected horticultural products of Guyana). Such research might be done jointly by Guyana and a reputable firm such as the International Trade Centre (ITC).
5. Government should begin negotiations with parties interested in leasing land for large scale, long-term production of selected commodities. Alternatively, joint venture arrangements between overseas buyers and domestic exporters such as Guysuco or other large producers could be worked out.

The key element of this latter recommendation is a question of scale. The intention is not to strike out the small exporters but there is an obvious need to make a "quantum leap" if our apparent comparative advantage is going to work for us in the short run.

The general conclusion is that a more aggressive governmental attitude is required if horticultural export volume is going to make any significant upward movement.

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ANALYSIS OF PRODUCTION, CONSUMPTION AND PRICES OF MEAT AND FISH IN GUYANA

By

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1. INTRODUCTION

1.1 Background

The meat and fish consumption are important elements of modern day diet. With economic development and modernization the demand for meat and fish production goes up and there is a discernible change in the consumption basket of the population with the elapse of time and with changes in income levels. The existence of a large number of meat, poultry and fish selling outlets in Georgetown, where a sixth of the population resides gives credence to the importance of these items in the national diet. In addition to this, for many households livestock is an important source of income and employment.

Consumption of livestock products such as beef, pork, chicken and fish are claiming increased share of food budgets in developing countries, particularly in those countries with relatively higher incomes. When per capita income grows, these trends are likely to intensify. Those countries which fail to meet this growing demand from domestic markets may resort to higher imports. On the other hand, accelerated livestock and poultry production would result in a rapid increase in the demand for feedgrains for them. This study will focus attention on some of the aspects of the demand/supply relationships with respect to meat and fish as Guyana endeavors to accelerate its economic growth.

The economic factors influencing the growth of total domestic utilization of livestock and fish products are: growth in population, increases in per capita real income, urbanization, variation in real prices, changes in tastes and preferences, availability and income elasticity of demand. One of the important factors that determines domestic utilization, is the income elasticity of demand. This quotient indicates the relationship between the rate of increase in per capita income and per capita consumption. There is a positive relationship between per capita income and per capita consumption of livestock products in most economies.

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In the developing countries such as Guyana it is expected that the income elasticity of demand for livestock products is higher as compared to cereals. The coefficient of income elasticity of demand is broadly classified for the Latin American region by FAO with an elasticity coefficient for meat estimated at 0.37 and income elasticity of demand for cereals estimated at 0.16.

It can be said that Guyana is fairly self sufficient in terms of domestic meat production. In addition, the vast inland rivers and estuaries and coastal expanses into the Atlantic Ocean has made the country a significant producer of inland and marine fish. In terms of average total per capita supply and intake of meat and fish, Guyana is second in position after Barbados in the Caribbean region.

The contribution of the livestock and fisheries subsectors to the agricultural GDP over the years, mirrors the pivotal role that these subsectors play in the national economy. The share of livestock in 1988, 1989, 1990, 1991 and 1992 were G\$ 94, G\$275, G\$358, G\$537 and G\$619 millions respectively. Similarly, it was G\$ 121, G\$923, G\$1768, G\$2765 and G\$3132 million respectively for the same period for the fisheries subsector. The average contribution of these subsectors were about 30 percent of the agriculture's contribution to GDP (Appendix 1).

1.2 Justification and Objectives

Cattle, pigs, lambs, chicken, some ducks and turkeys are reared by the farmers on their homesteads and sometimes on ranches. It is found that about 90 percent of the cattle slaughtered annually in Guyana comes from the small farms in coastal areas. It is also estimated that around 63 percent of the farms own cattle. The size of the herd may vary from 1 to 50 heads or larger. Any program directed at providing production incentives for these products, intended to increase farm household income and improve living standards, would need to understand the underlying factors affecting production and marketing of these products.

The general objective of this study is to reflect on the present pattern of consumption by the population, the availability of different kinds of meat and fish for a particular period, and to analyze the trends in the prices. Attempts were made at broadly identifying the sources of price changes and the elements of price formation in that context. As part of the study both the wholesale and retail prices were analyzed. The marketing mechanism including the available physical facilities are identified and discussed in this paper.

In this study an analysis is made of the time series data on production, export, import, net availability figures of these commodities and their price series, for available data. Analyses were made to determine the present and past trends and to prognosticate future consumption and price trends that may emerge due to the interaction of a number of factors. As such it was expected that this study would reveal the past and existing situation with regard to production, supply, pricing and consumer response, reflected in terms of the composition of their consumption basket for these commodities for different socio-economic classes.

1.3 Methodology

Simple linear regression and time trend analysis were undertaken to extrapolate the data for the projection of beef, pork, chicken and fish production. The formula used for determining trends were as follows:

$$Y_t = ae^{bt} \text{ in log linear form } \ln Y_t = a + bt$$

where Y_t , production of a particular item in period t
 a , intercept term

b , coefficient

t , time period in year

And,

$$Y_t = Y_0(1+r)^t$$

where, Y_0 , estimate of the variable for the base year

Y_t , estimate of the variable for the current year

r , annual growth rate of the variable

t , time interval under consideration

Similarly a multiple regression analysis was undertaken to project price. The model used for identifying important elements of price determination were

$$P_{it} = a + cY_{it} + dX_{jt} + kFE_t + U$$

where, P_{it} , price of i th commodity in the year t ; Y_{it} , production of the i th commodity in year t ; X_{jt} , production of other commodities(j); FE_t , exchange rate in year t ; U , stochastic error term; a , intercept; c , d , and k are coefficients.

In order to measure the dispersion of prices, the coefficient of variation were computed and chain price indices were utilized to determine year to year price changes.

1.4 Source of Data

This study utilized primary and secondary data and was divided into two phases. The first phase included the collection of secondary data and the review of publications available from various sources. In the second phase, effort was made to supplement the earlier data by collecting information from the various major outlets where these commodities are sold in the Georgetown area and making observations about the meat and fish trading in these markets.

2. DEMAND AND SUPPLY OF MEAT & FISH

2.1 Meat and Fish production

Apart from the unrecorded supply and trade in different wild animal meat, a large volume of trade goes on in chicken, beef, pork and lamb meat in Guyana. Duck and turkey are also reared for consumption. Fish and prawn are important sources of protein in the Guyanese diet and is also an export commodity.

The production trend for beef over the years show that there has been a marked decline in the production of beef between 1977 and 1985 (Table 1). The production decline is reflected by a drop in production from 3,190 metric tons in 1977 to 1600 metric tons in 1984. The production has tended to increase since then and reached an all time high of 4,200 metric tons in 1992. On the other hand, production of pork continued to decline more gradually and reached an all time low of 620 metric tons in 1992. Large scale imports of cheap chicken into Guyana hurt the domestic poultry industry and caused significant decline in domestic supply particularly onward of 1982. In 1991, 1,500 metric tons of domestic chicken were produced while imports reached 2,531 metric tons.

In sharp contrast to domestic production of meat, the production of fish increased by 59.9 per cent between 1979 and 1980 from 1,920 to 3,070 metric tons. Production of shrimp and prawns increased by 91.67 per cent in 1980 over the previous year. During the period 1980-1992, the production of shrimp and prawn showed either stagnation or some marginal decline over the period. Fish production showed some fluctuation but otherwise realized a continuous increase with highest catch of 3,720 metric tons reached in 1992.

2.2 Structure of Meat and Fish Supply

Domestic production of meat and fish are the most important determinants of the whole structure of demand and price formation and its integration in the food habits of the people. These are particularly true in the case of beef, chicken, pork, and fish. Domestic chicken production is very sensitive to the price of imported chicken. Imported chicken is cheaper than the domestic chicken by about 40 per cent.

Table 1: Production of Fish, Beef, Pork and Chicken, 1977-1992 (000MT)

ITEMS	YEARS															
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
BEEF	3.1	1.8	1.8	2.2	2	2.2	2.2	1.6	1.6	1.7	1.8	2	2.4	2.2	3	4.2
PORK	2.2	1.8	1.8	1.4	1.3	1.1	0.8	1	1	1.1	1.1	1.1	1	0.9	0.9	0.6
CHICKEN	7.1	10.2	10.2	10.2	10.3	7	3.8	4	2.8	3	3.6	3.9	2.2	2.1	1.5	3.1
FISH	18.3	14.3	19.2	30.7	30.8	33.2	34.8	34.3	34.3	33.8	32.8	31.5	32.5	33	36	37.2
PRAWN/ & SHRIMP	3.1	3.1	3.6	6.9	6.1	6.8	6	5.4	5.7	6.3	6.2	6.2	6.4	5.1	6	5.8

Source: Ministry of Agriculture & Bank of Guyana

Table 2 shows the comparative production structure of meat and fish for the years 1982 and 1992. The increases in the production share of beef and fish in 1992 occurred despite (as will be shown later) a 3,000 and 1,000 percent increase in the retail prices of fish and beef respectively.

Table 2: Comparative Production Structure of Meat and Fish, 1982 & 1992

ITEM/YEAR	1982	1992
BEEF	4.37%	7.1%
PORK	2.19%	1.19%
CHICKEN	14%	6.13%
FISH	66%	73.52%
PRAWN	13.52%	11.46%
TOTAL	100	100

The marginal decline in the total population and increases in production within the same reference period seems to confirm that there has been an increased share of beef and fish in people's diet. The fall in the domestic production of pork and chicken in the structure was caused by price hikes, inadequate supply of feed at reasonable price to the industries and relatively cheap imports. The decline in the prawn production was caused by small increases in the catch of large prawns and a large decline in the supply of small ones.

Table 3 shows the net annual availability of meat and fish taking into consideration the importation of chicken and adjustments for exports and fish spoilage.

Table 3: Net Domestic Availability of Meat & Fish, 1987 - 1992 (000 MT)

TYPE	YEARS					
	1987	1988	1989	1990	1991	1992
BEEF	1.80	2.00	2.40	2.22	3.00	3.90
PORK	1.10	1.10	1.00	0.90	0.90	0.60
CHICK	3.83	4.14	2.55	2.83	4.03	7.29
FISH	28.76	27.62	28.31	28.18	30.02	30.31
PRAWN	3.00	3.02	4.59	2.25	2.77	2.64
TOTALS	38.49	37.88	38.85	36.38	40.72	44.74

*NDA for chicken includes imports; for fish & prawn/shrimps figures represent net of spoilage (@ 10%) less exports.

2.3 Retail Outlets of Meat and Fish

Apart from a number of scattered retail shops in Georgetown, the Bourda and Stabroek markets are the primary retail centers. These are followed by La Penitence and the Kitty market centers, from where significant quantity of meat and fish are supplied to a large number of customers. Additionally, these markets supply a wide variety of daily necessities. Quality of services and prices at these markets are more or less the same.

2.3.1 Service of Retailers and General Marketing Costs

The Georgetown Abattoir is the sole source of beef and pork for all the retailers scattered in different market centers. Plucked local chicken are supplied by wholesalers. In the case of imported chicken, the retailers collect it from the importers/wholesalers. Supplies of fish and prawns, are bought on wharves from producers and middlemen.

The taxi is a very common transporting mode used for taking meat and fish from the wholesalers to the retailing destinations. Transport costs range from G\$ 180 to G\$ 300 depending on weight and distance. Loading and unloading the goods are usually done by the retailers themselves. The rents charged for the fish and meat shops also range from \$500 to \$1,400 per month depending on the location, floor space and the level of facility available in the particular area/market. Most meat retailers own refrigeration facilities for preserving meat. The energy costs for these outlets range between \$3,000 and \$5,000 per month.

2.4 Retailing of Meat and Fish

The Bourda market has the highest concentration of meat and fish retailing outlets in the Georgetown area. However, it appears that the Stabroek has the highest turnover in value terms (Table 4). It is also a cleaner market.

Table 4-A: Average Weekly Retail Sale (Lb & G\$) of Meat & Fish in La Penitence Market, Georgetown, Guyana, 1992

ITEMS	# Retailers	Average Sales (lb)	Value (G\$)	% Sale	% Value
BEEF	6	300	23052	52.63	56.17
CHICKEN	6*	75	8930	13.16	21.76
PORK					-
FISH	17	45	6055	7.89	14.75
SHRIMP	3	150	3000	26.32	7.32

* indicates mainly beef sellers

Table 4-B: Average Weekly Retail Sales (lb & G\$) of Meat & Fish in Kitty Market, Georgetown, 1992

ITEMS	#Retailers	Sale (lb)	Value (G\$)	%Sale	%Value
BEEF	8	200	15368	32.52	32.65
CHICKEN	4*	80	9526	13.01	20.24
PORK	3*	200	15462	32.52	32.85
FISH	10	35	4709	5.6	10.01
SHRIMP	2	100	2000	16.26	4.25

* Indicates mainly beef sellers

Table 4-C: Average Weekly Retail Sales (lb & G\$) of Meat & Fish in Stabroek Market, Georgetown, 1992

ITEMS	#Retailers	Sale (lb)	Value (G\$)	%Sale	%Value
BEEF	13	350	26894	19.72	26.55
CHICK	13*	180	21433	10.14	21.16
PORK	2*	250	19328	14.08	19.08
FISH	30	120	16146	6.75	15.94
SHRIMP	10	875	17500	49.3	17.28

* Indicates mainly beef sellers

Table 4-D: Average Weekly Retail Sales (lb & G\$) of Meat & Fish in Bourda Market, Georgetown, 1992

ITEMS	#Retailers	Sale (lb)	Value (G\$)	%Sale	%Value
BEEF	60	350	26894	31.59	28.6
CHICK	41*	120	14288	10.83	15.9
PORK	45*	300	23193	27.08	24.66
FISH	90	200	26910	18.05	28.61
SHRIMP	10	138	2760	12.45	2.94

* Indicates mainly beef sellers

La Penitence retailers have the lowest weekly figures for retailing of meat and fish, both in terms of quantity and value. The fish shops generally have poor sanitation and usually lack refrigerators. It appears that there is a need for improvement in sanitation around the fish outlets and development of facilities for refrigeration.

Presently, the consumers of Georgetown are being served by some 87 beef, 147 fish and 25 shrimp retail outlets in the above mentioned markets (Table 5). Beef, chicken and pork is often sold by the same retailer in one section of the market whereas, fish and shrimp is usually sold separately.

Table 5: Estimated Average Weekly Retail Sale of Meat and Fish at Stabroek, Bourda, La Penitence and the Kitty Markets:

ITEMS	Total Shops Number	Sale Per Shop Lbs	Av. Value Sales G\$	Sale % Av Qty %Total	Sale % Av Value
BEEF	87	333	25671	24.94	27.59
PORK	(50)	292	22526	21.87	24.20
CHICK	(64)	125	15548	9.37	16.71
FISH	147	154	20694	11.54	22.24
SHRIMP	25	431	8620	32.28	9.26

* figures within parenthesis are to indicate beef as major item in these outlets

Table 5 shows that although shrimp is retailed in largest volume per shop, in value terms it fetches the least among the categories of meat and fish. This is mainly due to low retail price of shrimp compared to other categories of meat and fish. The average sales volume of chicken is the lowest in comparison with other meat and fish. This is primarily due to the fact that chicken meat is one of the most expensive sold.

The relatively high price of local chicken has led to high levels of imports, exceeding domestic production. Seafoods (fish/shrimp) accounted for 44% of quantity and 32% of value of average weekly retail sales.

2.5 Share of the Markets in National Meat and Fish Productions

An effort (Table 6) has been made to assess the magnitude of the four afore-mentioned markets in national meat and fish production annual sales.

Table 6: Respective Shares of Four Markets of Georgetown in National Meat & Fish Production (MT)

Markets	Beef	Pork	Chicken	Fish	Shrimp
Stabroek	110(2.61)	10(1.67)	60(1.94)	90(0.24)	210(3.51)
Bourda	500(11.90)	320(53.33)	120(3.87)	430(1.16)	30(0.50)
La Penitence	50(1.19)		10(0.32)	20(0.05)	10(0.16)
Kitty	38(0.90)	14(2.33)	8(0.26)	8(0.02)	4(0.06)
All	698(16.61)	344(57.33)	198(6.39)	548(1.47)	254(4.25)

*Figures in parentheses show percentage share in total production

The amount of beef and pork sold at the four Georgetown markets represents 16.61 and 57.33 percent of the national production respectively. The quantity of fish and shrimp sold at the aforementioned retailed outlets is only about 1.47 and 4.2 percent, respectively of the national production. These low levels are an indication of the limited supply capacity of the wharf to retailers as was revealed in the interviews with some of the retailers there. The existence of better hygienic conditions in other city based retail outlets and preference by the consumers for such outlets could be an important reason for the lower share of these four market centers in the overall domestic fish and shrimp reticulation.

Table 7 shows the upward trend towards imports of chicken since 1988, reaching a high of almost 63% of consumption in 1991. This increase in imports is due to cheap chicken available from the USA and high local production costs due mainly to imported feed grains and other inputs.

Table 7: Share of Supply of Local and Imported Chicken in Total Consumption, 1986/92 (000 MT)

ITEMS	Years						
	1986	1987	1988	1989	1990	1991	1992
Local Chicken	3.00	3.60	3.90	2.20	2.10	1.50	3.10
Imported Chicken	0.20	0.23	0.24	0.35	0.72	2.53	4.19
Total	3.20	3.83	4.14	2.55	2.83	4.03	7.29
%Share Import	6.25	6.01	5.80	13.73	25.53	62.78	57.48

3. CONSUMPTION OF MEAT & FISH BY INCOME GROUPS

It is an accepted fact that the consumer demand for different items such as meat and fish is determined primarily by the level of personal disposable income. In the absence of a recent survey on income and expenditure by household groups in Guyana, this study uses the income expenditure indices constructed by stratifying the consumers in three income groups, as used by the Bank of Guyana and IDB.

A major problem, however, is that the exact percentage of the population in each group is unknown. In this study, household consumption stratified into consumption baskets 1, 2, and 3, based on monthly income, are expressed as low, medium, and high income groups. The ranges for these groups are up to G\$8,000, between G\$8,000 and G\$18,000 and lastly, a household earning over \$18000 per month. Research papers and other available documents indicate that about 70 percent of the population fall into the poverty range (Basket 1). As such, it can be assumed that the remaining 30 percent would be in the income-expenditure category of Baskets 2 (20%) and 3 (10%) respectively. In this analysis, the average size of the family has been taken to be composed of five persons as suggested by the Bureau of Statistics. A breakdown of the population by the three categories is given in Table 8.

Table 8: Population, Households and Percentage by Income Group

	Basket 1* Group upto \$8000	Basket 2* \$8001 - \$18000	Basket 3* Over \$18000
Population			
Total Population	516562	147589	73795
Households	103312	29518	14759
Percentage	70	20	10

* Income per Household per Month:1992

Source: Bank of Guyana & Estimates

3.1 Per Capita Per Household Consumption by Different Income Groups

Reported per capita consumption of meat and fish vary significantly from source to source. In a few cases total consumption has been reported as significantly exceeding total production (even after allowing for imports as the case may be). Lack of dependable data necessitated making assumptions regarding per capita consumption, particularly in the case of beef and pork. Such assumptions are based on discussions with knowledgeable persons and comparison of the relevant data with those obtained in adjoining countries and of the region. A modified version of the data is presented in Table 9.

In general, Income Groups 2 and 3 (Table 9), show increased household consumption of meat and seafoods over the lowest Income Group. This is as to be expected. Chicken and fish stand out as the two items showing greatest increased consumption with increasing levels of income. Basket 3 shows all household consumption of meat and seafood to be 141 percent higher than Basket one and 28 percent higher than Basket 2.

Even with this great difference, due to the high percentage of the national population falling into Basket 1 (70%) some 53 percent of beef, pork, chicken and fish are consumed by the lowest income group (below the poverty level).

Table 9: Estimated Monthly and Annual Household Consumption of Meat and Fish by Income Groups, 1992 (lbs)

Basket/ Item	Basket 1 Monthly/ HH	Basket 1 Annual/ TH	Basket 2 Monthly/ HH	Basket 2 Annual/ TH	Basket 3 Monthly/ HH	Basket 3 Annual/ TH
BEEF*	4	4958976	3	1062648	6	10626448
PORK*	0.70	867820	0.70	247951	1.4	247951
CHICKEN	2	2479488	12	4250592	16	2833728
FISH	8	9917952	12	4250592	12	2125296
ALL	14.70	18224236 (53.12)	27.70	9811783 (28.60)	35.40	6269623 (18.28)

- Note:
1. Other animal meat like duck, lamb, turkey, wild meat, etc are not included.
 2. Numbers in parentheses show percentage share in overall household consumption by income groups.
 3. Beef and pork have been modified to make the information more realistic.
 4. H.H = Per household, TH = Total household.

Table 10 shows that 77 percent of beef, 100 percent of pork and 20 percent of the fish produced in Guyana are consumed domestically. With respect to chicken, consumption exceeded domestic production and the excess demand was met from imports.

Table 10 : Share of Domestic Production Consumed in Guyana, 1992

Type	Beef	Pork	Chicken	Fish
Production*	4.20	3.10	0.62	37.12
%Share	76.66	100	140.32	19.93

*Production in 10³ metric tons

3.2 Structure of Per Capita Consumption

Annual per capita consumption of protein is shown (Table 11) to be highest (84.96 lbs) in Basket 3 and chicken (38.4 lbs) followed by fish (28.8 lb) are the favourite sources of protein. The low income groups (Basket 1) consumes more beef and pork than does the middle income group (Basket 2). Differences in the structure of per capita consumption indicate the existence of differences in consumer preferences among the income groups. Consumers' preference for fish remains high among all income groups and is dependant more on taste preferences than on price alone (as is reflected by high prices of fish).

From the data in Table 9 it was observed that the consumers in the low income group (Basket 1) would demand more chicken and fish as their income moved towards middle income range (Basket 2). Likewise, a significant increase in the demand for chicken and beef could be expected for the consumers in moving from the middle income range (Basket 2) to high income range (Basket 3).

Table 11: Structure of Annual Per Capita Consumption (lbs) by Income Groups, 1992

Commodity	Basket 1		Basket 2		Basket 3	
	lbs	%	lbs	%	lbs	%
BEEF	9.60	27.21	7.20	10.87	14.40	16.95
PORK	1.68	4.76	1.40	2.13	3.36	3.95
CHICKEN	4.80	13.61	28.80	43.50	38.40	45.20
FISH	19.20	54.42	28.80	43.50	28.80	33.90
TOTAL	35.28	100	66.20	100	84.96	100

4. ANALYSIS OF WHOLESALE PRICE OF MEAT AND FISH

4.1 Price Differentials

Price differentials arise as a result of different sources from which the wholesalers and retailers get their supplies of meat and fish and differences in the associated marketing costs and margins at the various marketing centers. The analyses of wholesale and retail prices show not only the movement of the price trends but also indicate the linkages with other variables, such as supply of same type of goods, availability of substitutes, consumer preferences and demand. The price variations among the different wholesalers and retailers may also be due to the differences in the quality of services provided by each of them.

4.2 Index of Wholesale Price

The stagnant, or marginally falling, population and fluctuating production trends of meat and fish over the last decade shows little impact on the wholesale price regime as it is found to have continued to increase over the same period. The highest increment in wholesale price is found for fish which increased by 2,900 percent between 1983 and 1992. The price of beef and pork also showed a quantum leap over this period with increases on the order of 1,200 percent. The wholesale price of chicken soared by 1,751 percent over the same period (Table 12).

Table 12: Average Wholesale Price (lb/G\$) of Meat and Fish, 1983-1992

ITEM	YEARS									
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
BEEF	5.52	8.47	10.23	11.05	12.33	17.56	32.46	37.59	53.6	72.52
PORK	5.68	7.46	9.98	10.24	10.14	14.74	30.78	36.32	59.77	71.91
CHICK	6.34	8.99	11.52	13.22	16.99	25.34	45.14	56.45	92.52	117.36
FISH	3.7	5.18	5.55	6.89	9.58	14.43	13.18	34.03	71.6	112.54

NOTE: fish price is average of all types

4.3 Index of Retail Prices

Similar to the wholesale price index, the retail price index for fish was found (Table 13) to have increased by 2,900 percent in 1992 as compared to 1983, the base year. The prices of beef and pork were found to have increased nine times over the same period. The price of chicken increased fifteen times over the period.

Marked increase in the retail prices occurred onwards of 1989 for all kinds of meat and fish. The price increases ranged from 69 to 108 percent as compared to 1988. It is interesting to note that fish, which was the cheapest commodity in 1983 became the most expensive of the examined products in 1992 (Table 13).

Table 13: Average Retail Price (lb/G\$) of Meat and Fish in Georgetown Outlets, 1983-1992

YEAR\ TYPE	Y E A R S									
	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
BEEF	7.65	10.09	11.74	15.53	13.89	19.77	36.21	43.21	58.55	77.09
PORK	7.5	8.8	11.38	11.58	11.63	16.87	34.42	41.19	64.7	77.14
CHIC	7.71	10.62	13.1	18.16	18.98	29.52	50.01	56.65	98.18	124.39
FISH	4.68	5.84	6.64	8.56	11.09	16.67	34.06	39.68	76.68	143.22

*Fish price is average of different types

The mean monthly retail price, standard deviation, and coefficient of variation for beef, pork, chicken and fish for the four major market centres Bourda, Stabroek, Kitty and La Penitence are shown in Table 14. From the Table it can be seen that the retail price of fish and chicken had the highest mean variation from month to month for the year 1992. Beef and pork showed a rather stable price regime, in that the monthly variations, were the least. Such results indicate a not so stable supply situation with regard to fish and chicken.

Table 14: Mean Monthly Variation of Retail Price (G\$/lb) for Meat & Fish in four markets, 1992

MEASURE ITEM	Mean (Monthly)	Standard Deviation	Coeff of Variation
Beef	78.26	5.97	7.62
Pork	77.97	4.88	6.25
Chicken	90.00	21.09	23.42
Fish	100.52	26.48	26.33

4.4 Difference Between Wholesale and Retail Prices

Differences between wholesale and retail prices not only reflect gross profit but also give an indication of the total marketing cost and margins associated with retailing. In the absence of marketing information, only general analysis of the absolute differences between the wholesale and retail prices could be carried out.

Table 15 shows the absolute margins per lb between wholesale and retail prices. Comparing Tables 12 and 15 the percentage of margin is as follows: beef 6%, pork 7%, chicken 1% and fish 20%. In general the margins seem to be on the low side, indicating low investments in processing, packaging and transport. Distortions in 1990 and 1992 chicken price differences, existed due to imports of chicken superimposed on domestic supply. Since imported chicken is much cheaper it can be suggested that wholesale/retail prices would have been much higher without the imports. Interviews with retailers revealed that the big difference in retail prices were caused by high marketing costs and associated risk in 1992 which also negatively affected the marketed quantity (lowering it) as compared to the previous year.

Table 15: Absolute Differences between Wholesale and Retail Prices (G\$/lb) of Meat and Fish, 1992

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Beef	2.13	1.62	1.51	1.48	1.51	2.21	3.75	5.82	4.95	4.57
Pork	1.82	1.34	1.40	1.34	1.56	2.13	3.64	4.87	4.93	5.23
Chic	1.34	1.63	1.58	2.92	1.49	6.31	4.87	0.10	5.66	1.17
Fish	0.89	0.66	0.89	1.56	1.99	2.24	3.42	5.65	1.17	22.0

4.4.1 Analysis of Gross Margin

Low gross margins per pound may indicate a low profit for the retailers but when all meat sales are considered together, the business turns out to be very profitable. The average weekly gross margin of the fish retailers was found to be \$3900, representing about 51.73 percent of the business operations. On the other hand, the gross margin from domestic chicken sales (weekly average) was only \$146 or 2.25% of overall margin (Table 16).

Table 16: Weekly Average Gross Margin of Different Meat and Fish Retailers, 1992

COMMODITIES	Gross Margin	Overall Margin
Beef	\$1439	21.96%
Pork	\$1577	24.06%
Chicken	\$146	2.25%
Fish	\$3900	51,73%

The total amount of gross margin from chicken retailing would go higher when the sale of imported chicken (which constitute about 75% of overall sale) is added.

4.5 Exchange Rate and Prices

Apart from the demand and supply mechanisms, the cost of the factors of production are important in formation of wholesale and retail prices. This is obvious in the case of meat and fish prices in that price escalations occurred amidst declining or stagnant population growth and/or insignificant or unaltered production scenario. Except for labour, most other factors such as feed, packaging materials and fuel are imported inputs of production. The opening up of the economy under structural adjustment and economic recovery programs altered the exchange rate ratios significantly, leaving a direct impact on the wholesale and retail price regime (Table 17).

Table 17: Official and Parallel Market Exchange Rates

Years	Official Rate	Parallel	Absolute Difference	Percentage Difference
1981	2.81	6.50	3.69	131.31
1982	3.00	8.00	5.00	60.00
1983	3.00	12.50	9.50	316.66
1984	3.83	14.00	10.17	265.53
1985	4.25	16.00	11.75	276.47
1986	4.27	17.42	13.15	307.46
1987	9.76	24.00	14.24	145.90
1988	10.00	35.75	25.75	257.50
1989	27.15	52.87	25.72	94.73
1990	76.89	85.17	8.28	10.76
1991	119.80	122.00	2.20	1.83
1992	125.91	126.50	0.59	0.46

Source: Bank of Guyana and World Bank *1 US\$=G\$

From the depreciating trend in the exchange rate and the exacerbated wholesale and retail prices one can conjure the positive relationship among them. Infact, almost a one to one correspondence was observed between the exchange rate and retail price of fish and meat (Table 18)³.

Table 18: Correlation (Coefficients) Matrix of Retail Prices and Exchange Rate, 1983-92

FISH	FISH	BEEF	PORK	CHICK	EXC RATE
Fish	1				
Beef	0.96092	1			
Pork	0.95573	0.995379	1		
Chicken	0.970242	0.994029	0.995892	1	
EXC RATE	0.914691	0.979954	.0987555	0.979047	1

A decline in pork consumption/supply and increases in chicken and beef would point to some replacement of pork with chicken or beef. The increased price of pork which was related to high feed costs, had a positive substitution effect leading to decreased consumption-production vortex of pork. A 171.5 percent depreciation in the exchange rate in local currency vis a vis US Dollar in 1988 increased the prices of fish, beef, pork and local chicken by as much as 108, 83, 104 and 69 percentage points respectively. Again in 1991 and 1992, there were marked increases in prices with the depreciating value of the local the currency against the US dollar.

5. PROJECTED OUTPUT AND PRICES

5.1 Changes in Wholesale Price

The wholesale price of fish, beef, pork, and local chicken are projected for the period from 1993 to 1998. The wholesale prices show positive inclination of all commodity prices to grow. The highest annual growth is noticeable for chicken and fish which were estimated at 11.59 and 9.76 percent respectively. The projected wholesale price of beef and pork were estimated to grow at about 7 percent per annum, (Table 19).

³ Correlation Coefficient matrix was estimated for the prices of meat and fish and foreign exchange rate and it was found that high degree of correlation existed among the prices and the foreign exchange rate.(Table 18)

Table 19: Trend and Projected Prices (G\$/lb) & Growth Rate of Wholesale Prices, 1992-1998

Year/ Item	1992 trend price	PROJECTED PRICE						
		1993	1994	1995	1996	1997	1998	Annual growth rate %
Beef	72.52	77.46	82.74	88.38	94.40	100.83	107.70	6.82
Pork	71.91	76.96	82.37	88.16	94.35	100.98	108.07	7.03
Chick	117.39	130.99	146.17	163.11	182.01	203.10	226.63	11.59
Fish	112.54	123.52	135.57	148.80	163.32	179.26	196.75	9.76

5.2 Changes in Retail Price

Retail prices are expected to grow at a much faster rate than the wholesale prices (Table 20). The annual rate of increase in the projected retail prices of fish and chicken were estimated at 26.43 and 17.38 percent, respectively, and for pork and beef the annual rate of increment were estimated at 17.11 and 14.27 percent, respectively. It is projected that the retail price of fish will increase about three times (300 percent) over the next five year period (end of 1998) with other parameters staying put. The results of the estimated models (Table 21) shows that retail price formation is significantly related to the level of domestic production of fish and meat, and the prevailing exchange rate. The estimated parameters had the expected signs. In most cases the explanatory power of the estimated equations was over 84 percent.

Table 20: Trend, Projected Price & Growth Rate of Retail Prices, 1992-1998

Year/ Item	1992 trend price	PROJECTED PRICE						
		1993	1994	1995	1996	1997	1998	annual growth rate %
Fish	143.22	181.10	229.00	289.57	366.16	463.00	585.46	26.43
Beef	77.09	88.09	100.66	115.02	131.43	150.18	171.61	14.27
Pork	77.14	90.33	100.66	123.87	145.06	169.87	198.93	17.11
Chick	124.39	146.00	105.78	201.15	236.10	277.13	325.29	17.38

** G \$ per lb

Table 21: Results of the Estimated Price Model

DEP VAR	RETAIL PRICES		
	Chick	Beef	P
VAR 1	5.6724	10.268	26
SE	4.5631	3.9634	14
VAR 2	-1.1799	-1.8079	-1
SE	2.5040	1.1095	1.
VAR 3	0.8722	0.2582	0.
SE	0.1715	0.1040	0.
CONST	26.117	16.624	24
SE	8.8599	3.8251	3.
R ²	80.171	98.262	98
DF	12	12	
# OBS	16	16	

**Var 1 production of commodity; Var 2 production of other commodities; Var 3 prevail
Narration explained by the model; DF Degrees of freedom. Estimated equations and varia

5.3 Movement in Nominal and Real Prices:

Table 22 shows the upward movement in nominal and de prices of beef, pork, chicken and fish. It shows that the declined between 1989 and 1992, except for fish where a 7 p in 1992. The real price of beef, pork and chicken dec reference period.

Table 22: Nominal and Real Retail Price Movement of

ITEM/YEAR	1989	1990
BEEF	Nominal 36.21 Real 100	Nominal 43.41 Real 73
PORK	Nominal 34.42 Real 100	Nominal 41.19 Real 73
Chicken/local	Nominal 50.01 Real 100	Nominal 56.25 Real 69
Chicken/ import	Nominal Real	Nominal Real
FISH	Nominal 34.06 Real 100	Nominal 39.68 Real 70.32

6. CONCLUSIONS

Increasingly, products such as beef, pork, chicken and fish are taking a greater share of the food budget of people. With economic development and rising income, the dietary composition tends to move towards this type of products. These trends are likely to intensify in future years as income continues to rise. Countries which have failed to balance domestic production with domestic demand have resorted to importation of these products. This requires spending foreign exchange and affects domestic capacity to produce these commodities. A loss of income and loss of employment to its people. Generally, when domestic demand and consequential increases in production there is a corresponding increase in the demand for feedstock.

Presently, Guyana is almost self sufficient in beef, milk and fish. These products in the national economy are significant and constitute about 10% of agricultural GDP. In Guyana, according to some estimates, 63 percent of the beef slaughtered in Guyana are supplied by the small farmers in the coastal areas. Beef, pork and chicken some turkey, duck, mutton and other wild meats are also produced and consumed.

The structure of production showed substantial changes between 1980 and 1992. The production trend of beef showed a fluctuating pattern reaching an all time high of 1,200 metric tons in 1992. Production of pork continued to decline and reached a low figure of 600 metric tons in 1992. Domestic production of chicken hit its lowest output of only 1,500 metric tons which was cushioned by imports of 2,000 metric tons of chicken in 1991. In 1992 the domestic chicken production rose substantially when it reached 3,000 metric tons. The import of chicken reached an all time high of 4,190 metric tons in the same year.

Fish production showed gradual increases which showed an acceleration since 1980. Similarly, prawn production showed a fluctuating pattern but averaged around 6,000 metric tons annually during 1986 to 1992. The increase in production and consumption of beef and chicken would suggest that some substitution of pork have taken place in the country.

In Georgetown, the Bourda, Stabroek, Kitty and the La Penitence are the main meat outlets. The wholesalers and retailers receive meat from the Bourda and Stabroek whereas fish is collected from the wharf.

The existence of wide difference in the consumption of chicken and beef by the mid-high income groups validates the general assumption that these products are mainly consumed by higher levels of earnings.

- c. **Studies should be undertaken to determine marketin for various kinds of meat and fish.**
- d. **Improvement of sanitation and physical facilities markets of Georgetown is urgent. These should inc fish.**
- e. **There needs to be a conscious effort to increase the and restrict imports of cheap chicken or as a sho import tax to protect the domestic poultry industry.**
- f. **Some price stabilization measure is required by acting so that prices of meat and fish remain within the reac consume beef and fish in greatest quantities.**
- g. **Given the past trend price of most meat and fish, it items will increase substantially in nominal terms by will increase in small increments over the same perioo will in fact be a negligible increase. This later situation to stimulate production in these areas.**
- h. **The livestock and poultry feed industry requires immed dwindling domestic supplies and increasing demand.**

**APPENDIX 2: Modified Version of Per Month Per Household
& Fish, weight in lbs**

ITEM/ GROUP	INCOME GROUP ONE	INCOME GROUP TWO
BEEF	12(4)	12(3)
PORK	1 (0.07)	1(0.70)
CHICKEN	2	8
FISH	8	12
ALL	15.70	24.70

APPENDIX 3: Export of Fish and Shrimp from Guyana, 1987

ITEMS	1987		198
	MT	VALUE US\$	MT
Prawns/frozen	2286.23	25,194,272.2	1,928.87
SB/WB Frozen*	292.06	1,391,0	620.86
SB/WB Dried			14.25
Fin Fish Dried	765.9	1,678,845.37	726.95
Salted Fish			10
Smoked Fish			0.05
Frozen Crab Mt			0.77
Shark Fins			0.82
Fish Glue			0.09

Note: Blank Spaces Signify Non Availability of Data

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2. THE DRAINAGE AND IRRIGATION SYSTEM IN GUYANA PRESENT CONDITION

2.1 Background

2.1.1 Structure

A drainage and irrigation system always consists of a water part and a water disposing part. In Guyana the system was developed by the estate owners along the coastlands of Guyana who drew water from the river behind their estates. These were often dammed to create control structures and a distributary canal.⁽¹⁾

Drainage canals were excavated along the two boundaries of the estate and a canal dug through the middle. The drainage canals often flow through a sluice. The two drainage canals and the irrigation canal form the estate's drainage and irrigation (D&I) system.

Access to the whole length of the estate was provided by the drainage canals on both sides of the drainage canals, built up from the earth with the drainage canals were constructed. Traditionally the dams are not used for access as this was believed to lead to erosion and overtopping and flooding.

2.1.2 Operation

The operation of the system today is still much the same as when it was first constructed. The flow of water into the primary distributary canal is controlled by regulators on the feeder conservancy or river. In many places the flow is by gravity flow although there are pumps on some of the distributary canals. A distributary canal is in turn controlled by regulators and each distributary canal has its own regulator to take water to the fields.

When water is released from the conservancy, the water rises and this flows into the secondary canals when the regulator operates to allow different areas along the distributary canal to be irrigated. It is important to emphasise that for the system to work efficiently, the schedule to irrigate their fields and all users in one estate must be coordinated. Originally, this was not a problem as field operations were together. Originally, this was not a problem as the system was under the management of one estate owner. The situation is different today (see the situation below).

¹. There are conservancies in Regions 2, 3, 4 and 5. These are the 1 Demerara Water Conservancy, known also as the Boerasirie Creek Conservancy and the Abary Conservancy respectively. In Region 6 water is pumped from

2.2.2 Declared D&I Areas

All Declared D&I areas used to come under the jurisdiction of the Irrigation Board. They had the Hydraulics Division of the Board to assist it in technical matters and superintendents were appointed.

In 1983, under the regionalisation programme, the responsibilities were devolved to the Regional Authorities, the Regional Development Boards, and the Regional Executive Officer as the executive authority. The Regional Engineer and superintendents. The Agriculture Department is present in most regions, was intended to be a means of representing farmers as they were represented on this.

The Regional Authorities are required by the Drainage and Irrigation Act to assess the level of drainage and irrigation rates per acre and levy charges from owners of land. These revenues are used for the maintenance (O&M) of the works in the D&I Area which is under the control of the D&I Board (that is, under the control of the D&I Board).

2.2.3 Regional Authorities v. Local Authorities

Two complications arise immediately: not all works are "vested", and not all D&I areas are "Declared". Thus O&M is the responsibility of one agency. In Declared D&I areas, which are under regional control, it is the Local Authorities who are responsible for O&M. The proportion of D&I areas under regional control varies considerably and ranges from 5 -100%.

The Local Authorities are also responsible for the maintenance of works in Declared areas unless these are under the control of the regional development authorities. The situation is further complicated in that some areas belong to more than one Local Authority and a few areas are under the control of a Local Authority in a non-organised area.

2.2.4 Budgeting for works

Yearly estimates are done to budget for the costs of regular maintenance which is mainly manual work. Rehabilitation work, which is done by mechanical means, major repairs of structures and replacement of structures are capital expenditure and come out of the capital budget. The supervision of the regional engineer and includes other works of a similar nature. Responsibility for upgrading works, that is, works of a similar nature, part financing from international sources, is undertaken by the Irrigation Department.

2.3.1 Reasons for Poor Maintenance

- a) **Inadequate mapping:** Each D&I area is represented in at Hydraulics Division in Georgetown. But these are not a The drawings themselves are old, they often do not show residential areas. More seriously, works under the res Authorities are not mapped which presents a major draw the scope of rehabilitation works in the D&I areas should
- b) **Divided responsibilities:** As mentioned above, respons and maintenance of one D&I area may be divided betwe even several, Local Authorities. This creates ad Management should be under one authority to ensure th operated and maintained.
- c) **Technical capability:** The level of technical educatio departments is poor, as is the level of education in the ac of material resources means that engineers have no tra D&I areas.
- d) **Conservancy Boards:** These are required to operate conservancies but in practise little control is exercised of freedom to interfere with gates. This is a serious water availability, not water needs, should determine necessary information on the water potential of the co allow the conservancy boards to regulate flow proper

The Boards also experience difficulties collecting rates the management of the conservancies relies heavily, on the sugar estates. As a consequence the interest o the sugar growers, tends to guide decisions about Commissioners on both Boards are Guysuco repres resentment among other users: ideally distribution of by a body which is independent of the water users. I of the sugar estates, it is likely that the system won

- e) **Underestimation of works budget:** The D&I e calculate D&I rates only include direct costs of O& administrative costs, capital costs and other indirect have been submitted to the State Planning Secreta back to between 40 and 60% of the original figure
- f) **Poor rate collection:** Underestimates of required the system are compounded by poor rate coll government does not pay the full 10% subsidy.

2.4 Summary of problems and guidelines for a new approach

In summary, the problems encountered in the O&M of the D&I number of reasons.

- a) The system itself requires continual maintenance which is efficient management. Costs are increased by the high depreciation. Operation must also be carefully controlled to ensure efficiency.
- b) Efficient management is made difficult by the fact that D&I are in one administrative unit but are the responsibility of the RDCs and local authorities. Some are even completely outside organizational boundaries.
- c) Efficient management is further undermined by the lack of funds in RDCs. This is due to poor budgeting, government inaction and non-payment by other authorities. These authorities in turn are not collecting rates because they themselves are under resource constraints and need redress to enforce payment.
- d) Inadequate management itself has created a vicious circle of alienated farmers and further deterioration of the system. As a result, all systems in the country are in need of extensive rehabilitation and farmers alienated from the administrative authorities.

To break out of this impasse, the government will have to introduce radical changes. A complete programme of measures will be proposed and a number of principles to guide policy makers are given.

- a) Responsibility for the operation of all D&I systems is to be brought under the management of one agency.
- b) Rate collection should be the responsibility of the same agency as for providing O&M.
- c) The collection of these rates should be explicit and not hidden in other levying systems.
- d) Rates should cover the cost of the O&M of the project. Farmers only - farmers should be responsible for all field work.
- e) Information on land tenure must be updated to provide a basis for rate collection by rate collectors to carry out their job and enforce it where necessary.

All these problems have been encountered in the past throughout the world. In the Guyanese case, the origin of the problem is at the secondary level, the system was under one management, the system required only at the primary level. Where large area management, as in the Guysuco estates or in large rice areas, is managed.

On the other hand, in areas where many farmers share responsibility for management, the system has nearly failed. The economic analysis as well as in the institutional arrangement system detailed in Part One. Thus whilst the guidelines at the end of Part One are important, it may be the economic problem of managing a common property resource. The chances of establishing a sustainable system are not good.

3.2 Solutions to the Common Property Resource

The major weakness identified by the economic analysis of common property resources is that the interests of service users and service providers are conflicting. Whilst the farmers want a good service, the bureaucrats want to maximise their returns in the form of salaries. Proposals to develop a new system must confront this conflict.

The key is to integrate the interests of service users and service providers by making the agency responsible for D&I subject to a performance evaluation and providing bonuses for staff. This gives service providers an incentive to provide a good service because it will increase the farmers to pay rates. It also gives rate collectors an incentive to collect rates. The management of the service agency can maximise its performance evaluation and providing bonuses for staff.

The agency can cut its own costs by working closely with farmers. At the moment is that farmers feel so alienated from the service agency that they sabotage the system, taking water when they are not supposed to. This carries a high cost. By addressing this through the incorporation of farmer representatives into the planning and implementation, the agency should save itself the cost of sabotage. That their rates are directly related to the amount of water received and this in turn is directly related to the state of the system. The agency has a responsibility. Certain maintenance tasks may be best undertaken either in remission for rates or under a paid contract.

4. REHABILITATION

4.1 The Cost of Rehabilitation

It is difficult to arrive at a total cost estimate for the system because costs are affected by a number of variables which vary in some areas the D&I system operates entirely through gravity and no pumps are required. Costs also vary with the intensity of the rehabilitation work. Canal density is often higher than required for maximum efficiency.

Despite this, some idea about the costs of rehabilitation can be obtained from current unit costs charged by contractors. Information furnished by the engineering consultant at Kayman Sankar Limited indicates that the per acre requirements for canals and access dams are as follows:

According to this report which looks at the state of the system in Region 6, an average acre of land is served by 42 ft (12.6 metres) of irrigation canals and 115 ft (34.5 metres) of access roads. According to Sankar consultant's figures, this would give a per acre cost of re-digging both the drainage and irrigation canals and levees of US\$156 on one project and G\$918 on another. This gives per acre costs of G\$15 028 and G\$11 934. Costs including re-digging of drains about 50% more, that is G\$22 542 (US\$190) and G\$18 934 (US\$163).

These figures do not include the cost of structures or pumps. The total cost per acre is to look at a project and divide the total cost by the benefiting area. The IDB loan contract for the rehabilitation of the lands in the Bath/Friendship/Craig Relief/Vreed-en-Hoop area has a total cost of US\$4.5 million for direct construction costs for the rehabilitation of the lands in the Bath/Friendship/Craig Relief/Vreed-en-Hoop area. The per acre cost of US\$353 per acre.

These costs show considerable variation. Canal rehabilitation costs range from US\$100 and US\$190 per acre, giving an average of US\$145 per acre. Complete works add another US\$200. In order to have a more accurate estimate of costs a systematic study is required. However the figure given is a minimum level of rehabilitation costs per acre.

². Netherlands Engineering Consultants: Report on the Rehabilitation of the Irrigation Systems in Regions 3,4 and 6, September 1987.

to unofficially rent land at a price far above that charged, that is equivalent to 4 bags of reasonable quality paddy, to be at least 4 bags, or 20%, above average, given an average of 4 bags.

4.3 Meeting the Costs of Rehabilitation

It appears that quality and yields of paddy will increase, which is commercially attractive. Already farmers who have made the necessary investments and draw the benefits of the system continue to be good, this trend is likely to continue. It is that smaller farmers are unlikely to be able to obtain credit, they already face serious difficulties in obtaining credit and themselves have neither the capacity nor the resources to finance the necessary investments.

Another problem facing smaller farmers is that the D&I system is not of scale. The original design of the D&I system under Section One. It was noted that each estate comprised a D&I system, therefore under one management. Where systems have been established as on the sugar estates or on large land holdings like the D&I system they have continued to function well. However, in many areas the D&I system has been divided among many farmers. Where these farmers operate the system, production has suffered. In addition, it is not possible if all farmers within a D&I system are committed to the system.

It is clear that successful rehabilitation of the system therefore requires either the consolidation of large estates or cooperation among smaller farmers. This is a basic factor in the choices made by any investor who is considering an investment. The best chance of a good return on an investment will be if the investor can guarantee good maintenance after the completion of the investment. It will always have an advantage in a commercial credit market if the government can demonstrate its seriousness to support the investment. It may be able to convince lenders that D&I rehabilitation establishes a direct link between government policies and the needs of farmers, to raise money for D&I rehabilitation.

It is not only the availability of material resources for rehabilitation. Human resources are also a consideration. There are not enough skilled personnel available in the country at the moment to carry out a rehabilitation programme. It will take many years. Thus any programme will need to include training of skilled personnel available. It should also include with the rehabilitation development to ensure that in the future Guyana can maintain the system.

The conservancies should remain under separate control authorities in order to ensure independence in the allocation of the authorities will be required by law to provide adequate funds to allow them to carry out their regulatory function. This budget and therefore passed back through the rates to

These are the outlines for the operation of a new system the existing system will require very careful further study and preparation of supportive legislation. The issue of funding is addressed: the new entities will be compromised in carrying out their function if legal sanctions for non payment are not enforced. This requires as well as the preparation of an up-to-date land

The new system will also have to be phased in gradually. O&M should be passed over immediately to the new entities over a few years for them to become self financing. Initially assist them up. This will involve funds to meet overhead costs of transport - and to meet the costs of a first round of O&M of the new system.

The deteriorated state of most of the D&I system means that the authorities will not be able to focus rate collection on areas in which they can provide service. These may be areas which have recently benefited from infrastructure improvement projects, for example the IFAD project in the north. The full cost of O&M but only a percentage of overhead costs would have to be met through subsidies which would be provided to rehabilitated, allowing the authorities to spread the overhead costs over service users.

5.2 Rehabilitation

Given that the areas requiring rehabilitation are extensive and the resources available for this work are limited, the government needs to establish a rational system of allocating resources for rehabilitation. In a rationing system there are winners and losers. The challenge is to establish a rationing system which maximises the number of service users.

In deciding its policy, the government also needs to be aware of the following factors:

- most funds available for rehabilitation are likely to come from donors or commercial banks as it has few resources of its own.
- therefore any policy it develops must take these factors into account.

and US\$40 million. This kind of financing is unlikely and would still face the difficult task of allocating what was noted. We note that the success of such projects in the past has not been the case. The IDB 807/SF-GY loan were completed before the Bush Polder project, also funded by the IDB, has run.

The government must also bear in mind that international financing Provision for this must be built into any project. This is not to say that they have a good chance of success, generating sufficient income. Failed projects carry a very high cost in terms of income.

Rather than undertaking the responsibility for identifying suitable projects, it is proposed that the government request financing from international organisations to establish a revolving fund to which farmers could apply for loans to carry out rehabilitation. Resources should be allocated to a number of criteria, including economic return and social benefit. A criterion would favour farmers from areas where the costs of rehabilitation were cheaper. Farmers who have failed rehabilitation would find it difficult to get funding.

Funders would also have to assess how sustainable a rehabilitation project would be. In turn, this would create incentives for farmers to work together. If farmers share the same secondary system, it has already been shown that they cooperate in carrying out field operations, yields are higher and a loan who could not demonstrate that he had a good project would be an easily identifiable bad risk. The chances of success increase with cooperation, creating incentives for farmers to apply for funding applications.

This system would tend to favour the more literate and better educated, likely to be the larger farmers. Government would have to be assisting smaller farmers to organise so as to facilitate rehabilitation. This can be done through the development of a more effective farm water management system which is so essential in Guyanese agriculture. Rehabilitation programmes to address this issue should automatically include programmes to address this issue. The terms of loans could be an added service.

The revolving fund itself should be administered by the government. They should conduct their own assessment of each loan application. For smaller farmers to get loans, the terms of lending would have to be made available commercially to the bigger farmers.

immediately clear that in nearly three crops the farmer this excludes interest: if a rate of 20% is used and a two cost of repayment is G\$10 125 per crop.

These figures are only rough estimates but they d programme of D&I works based on cost recovery. Gi donors on this matter, and the inability of government programme, it may be the best option available. It will debt servicing and repayment.

A system of cost recovery has another very important : the O&M of the D&I system after the capital works hav that the farmer has mortgaged himself to carry out incentive to carry out efficient O&M of his own, to en same and to put pressure on his regional authority to c yields will suffer and he won't be able to pay off his l

There is a limit however to how far cost recovery can b focused on the costs associated with clearing second: leaves the rehabilitation of the primary system and the r The burden of paying for this work cannot be passed should seek direct donor financing for these works and new D&I authorities.

5.3 Summary

The proposed policy for the improvement of D&I servic the outset that the government faces two problems sim the operation and maintenance of the system and the 1 major rehabilitation programme. It also acknowledges t objective is dependent on achieving the first, so rehabilitation of the system cannot be viewed separate

It has been shown that successful operation and mainte an institutional structure which integrates the intere providers. A new system of financially autonomous re this purpose. In addition, changes in the law to facil of rates and an updated land register will be necessar arrangements with legal force.

The lack of funds available for government to launch it means that it must rely on the commercial banks and i will have a much better chance of attracting these fu for reforming the O&M of the D&I system. It will

LAND POLICY AND ADMINISTRATION

By: Nigel Durrant, Agriculture
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1. THE STRUCTURE OF LAND ADMINISTRATION

Three separate entities are responsible for land

- a) The Commissioner of Lands and Surveys;
- b) The Guyana Forestry Commission, and
- c) The Guyana Geology and Mines Commission

The Commissioner of Lands and Surveys, in addition to being responsible for the administration of agricultural

The Guyana Forestry Commission is a semi-autonomous body with responsibility for the administration of the petroleum sector. The Commission grants leases and timber sales agreements. Operators are granted exclusive rights for fifteen

The Guyana Geology and Mines Commission is responsible for the granting of licenses to operators to engage in bauxite mining (bauxite).

Apart from the above mentioned institutions the Land Agency and the Deeds of Registry also have a land registration system.

¹ Several papers were drawn on in the preparation of these notes from the Land Tenure Centre, U. Wisconsin and Ms. Sarah Purnell of the Ministry of Agriculture Report, 1992 of the Lands and Surveys Department, Ministry of Agriculture

The land tenure system in Guyana consists basic

- (i) owner operated;
- (ii) rental or lease of less than 21 years
- (iii) rental or lease of 21 years or more;
- (iv) rented or leased by one person and
- (v) other types of tenancy.

According to the Guyana Rural Farm Household Survey, the arrangements in terms of the frequency with which the farms are operated and the lands rented or leased for more than 21 years are as follows:

3. LAND DISTRIBUTION AND LAND USE

The Rural Farm Household Survey conducted in 1997/98 under the IICA/IFAD Socioeconomic Survey both identified the predominant farm size type. (Table 2 and 3). The farm sector has been largely influenced by the colonial era policies which restricted the size and number of plots owned by workers. Post independence policies, related to land reform, have not effectively reduce the dual structure of farm size, and farm dichotomy has persisted.

Table 2: Number of farm household and acreage by farm size

Farm Size (Acres)	Number of farm households	Cumulative percentage
≤ 2.5	6,252	25
2.50 - 4.99	3,732	40
5.00 - 9.99	4,906	60
10.00 - 14.99	3,404	74
15.00 - 24.99	3,600	88
25.00 - 49.99	1,591	95
50.00 and over	1,150	100
TOTAL	24,635	

Source: Rural Farm Household Survey.

4. LAND DEVELOPMENT SCHEMES

Over the years a number of land development schemes have been implemented for the purpose of improving drainage and irrigation facilities and

Table 5 provides information on a number of these land development schemes.

Table 5: Land Development Schemes

Scheme	Total Area (Acres)
1. Tapakuma	30,000
2 Vargenoegen	3,400
3 West Demerara	3,400
4 Garden of Eden	1,000
5 Linden/Soesdyke Yarakabara	64,000
6 Cane Grove	7,223 (agri. land only)
7 MMA/ADA	84,000
8 Black Bush Polder	18,000
9 Charity / Amazon	500
10 Wauna / Yarakita	5,000
11 Matthews Ridge (not functioning)	

Land development schemes are generally under the jurisdiction of the Local Government Democratic Councils. The MMA/ADA scheme is however an exception and has its own Executive Board.

The land allocated under Land Development schemes is often of a small size. This is done so as to accommodate as many farmers as possible. The concept of maximum size of plot required to support a family is not based on any concrete scientific assessments of farm size.

The Commissioner of Lands may sometimes grant larger applications but these applications must be accompanied by a farm development plan and go through the normal process.

Land may be repossessed by the state if it is not productive.

Rental rates for State Lands were set in Order No 6 of 1985 outlined in Table 7.

Table 7: Rental rates as set in Order No. 6 of 1985, Ch 62

Type	Rate (per acre, per year)
Lands outside of Land Development Schemes:	
- first 5 years	\$5.0
- second 5 years	\$7.5
Lands within Land Development Schemes	Varies from \$2.0 to \$10.0 for Black Bush Polde

A number of inefficiencies and constraints in the Land Administration contributed to the ineffectiveness of the above described land use summarized as follows:

a) Registry System

The Registry of Deeds Office is under the direction of the Registrar of Deeds and records transactions related to the buying and selling of land, cancellation of mortgages, encumbrances, leaseholds and

A number of problems have been identified regarding the functions of this institution:

- Excessive bureaucracy, particularly with regard to the Registrar of Deeds Office results in a costly and time consuming system. This deters land holders from attempting to obtain title and hold land in smaller plots.
- The Registrar of Deeds Offices in Georgetown are in poor condition. Poor remuneration and consequent poor personnel, the lack of basic facilities and modern equipment, and unintentional mistakes, and allegations of corruption of the inadequate conditions.

b) Land Taxation and Lease Fee Collection

The land taxation and lease collection systems are ineffective. Land holders are simply able to avoid payment, while leaseholders often fail to pay. There has accordingly been little incentive for large holders to put their land into more productive use.

6. RECOMMENDATIONS

6.1 Policy Considerations

In 1992 it was agreed, as one of the conditions of the IPED to transfer free-hold titles to lease holders on plots of 1000 schemes. A projection of 5,000 titles per annum or 75 percent envisaged. This policy was not implemented.

Security of tenure however, is an area to which priority security will lead to increased agricultural production; in improvements and more access to formal credit markets accept long term leases as collateral, IPED also accepts 75 percent coverage as compared with 160 percent for freehold of the private sector in D&I management).

The determination of the market price for land is another Criteria for determining the market price for land should utility services and land capability.

6.2 Institutional Efficiency

The improved efficiency of the Land Administration system resolving many of the problems that impact negatively on number of actions may be suggested in order to achieve a efficiency:

- reviewing of all present rates/fees and their collection
- elimination of the backlog of applications and provision
- strengthening of the Lands and Surveys Department formulation of projects for institution building and to provide emolument, equipment and training of personnel
- improving coordination of diverse land management

6.3 Land Information System

The lack of accessible and reliable data is one of the major problems in the land administration system.

7. CONCLUSION

The satisfactory resolution of the various land related problems discussed in this paper would impact positively on the economic development of Guyana. The studies prepared by International Organizations have identified land tenure and title as a major constraint to agricultural development in Guyana. In fact, the requirement in many of the agreements signed between the Guyanese Government and International Institutions.

It is therefore, apparent that priority attention should be given to the primary objective of improving the policy environment for land management and the Land Registry System.

PART ONE

THE QUANTITY AND COMPOSITION OF

1. Total Official Lending to the Sector

Table 1 provides data on lending to the agricultural sector by the Commercial Bank of Guyana and Gaibank, Guyana's only development bank, from 1980 to 1990.

Table 1: Commercial Bank Lending and Agricultural Sector 1980 -1990 (G\$)

Year	Commercial Bank lending to the Agricultural Sector * ¹	Gaibank lending to the Agricultural Sector
1980	49.7	10
1981	99.6	15
1982	70.2	17
1983	207.6	19
1984	170.5	12
1985	276.4	23
1986	98.6	11
1987	85.5	20
1988	144.7	44
1989	266.1	82
1990	349.0	n/

Source: Bank of Guyana, given in Guyana Sustained Growth", World Bank, 1992; Gait

* does not include rice milling

¹ Between 1980 and 1985, the commercial bank lending to the agricultural sector amounts to the nationalised sugar industry, lending to the sector.

2. The Composition of Agricultural Credit by Subsector

a) Commercial Credit

**Table 3: Net Annual Increase in Commercial Bank Balances
(December - December, G\$ millions)**

Sub Sector	1981	1982	1983	1984
sugarcane	0.4	0.4	(0.4)	0
paddy	0.2	0	0.4	(0.9)
other farming	2.3	0.3	(3.1)	0.4
livestock	(0.5)	(0.3)	1.3	4.9
forestry	0.2	(0.1)	0.7	(1.7)
shrimp and other fishing	3.7	1.0	1.8	7.7
rice milling	(0.3)	0.5	(0.8)	0.5
sugar/molasses	46.4	(30.3)	137.8	(47.7)
TOTAL	52.4	(28.5)	137.7	(36.6)

Sub Sector	1987	1988	1989	1990
sugarcane	0	0.4	1.2	17.3
paddy	1.2	3.8	49.1	24.6
other farming	8.7	18	36.3	(26)
livestock	(0.5)	15.4	12.7	24.
forestry	0.6	0.1	1.9	0.2
shrimp and other fishing	20.6	19.9	20	42
rice milling	(2.5)	59.7	248.2	10
sugar/molasses	(42.6)	0.1	26.7	(2
TOTAL	(34.3)	108.4	396.1	1

Source: Bank of Guyana

Table 4 Continued

Subsector	1986	1987	1988	1991
In/Off-Shore Fishing	1.4	1.3	2.2	5.6
Rice Investment	1.1	4.4	5.0	11.5
Rice Production Credit	6.1	11.1	17.8	125.6
Sugar Cane	0.4	0.4	0.2	0.2
Crops (incl. Tree Crop)	3.0	3.5	2.8	2.3
Tobacco	0	1.1	0	0
Beef	0	0.1	0.1	0.2
Dairy	2.0	1.2	3.9	1.3
Pigs	0.5	0.5	0.4	1.1
Poultry	0	0	1.4	9.7
Other livestock	1.4	1.3	1.0	1.8
Total	15.9	14.9	34.8	159

The lack of investment lending also reflects the fact that the bank liabilities in instruments which have a life of more than three years: time deposits for onlending, but these are very short term in Guyana

Total private sector lending to agriculture by the middle of 1993 was total private deposits equal to G\$26 billion. Agriculture's share was 10% of private sector lending.

Reasons for the limited lending to agriculture

i) Established Patterns

Traditionally the banks have not been closely associated with the agricultural sector. Both GBTI and NBIC were originally local branches with a reputation for specialising in short term trade financing and do not have the institutional capacity to become involved in lending to agriculture. The fact that they are urban based, with headquarters in Georgetown, makes them inaccessible to most of the rural areas.

ii) High Risk

The banks may also be reluctant to lend to agriculture because the risks are too high. The risk of loss of production as a result of adverse weather conditions is always present in agriculture and in Guyana there are no insurance schemes exist to offset this risk. There are also increases in the chances of harvest losses through flooding due to the deteriorated state of the national infrastructure. The increase in the chances of harvest losses through flooding, combined with inadequate extension services, the availability of inferior quality production and pest problems, irregular markets; poor roads and inadequate transportation makes the process slow.

iii) Lack of Experience

Faced with this level of risk, banks would have to adopt a screening system to identify potential borrowers, especially among small farmers. This is an expensive process and the banks do not have the resources. It is made all the more difficult by the limited amount of funds available in the agricultural sector to assist in project selection.

As an alternative to screening, the banks demand collateral, which effectively eliminates all the small borrowers and results in lending to the largest clients.

Table 5: Gaibank lending to the agricultural and industrial sectors (Million)

Year	Agricultural lending	Industrial lending
1980	10.3	8.6
1981	15.2	8.1
1982	17.2	7.4
1983	19.7	9.8
1984	12.0	28.5
1985	23.4	5.4
1986	11.4	8.9
1987	20.7	25.5
1988	44.5	65.2
1991	159.0	1109 ²
1992	210	299

Source: Gaibank

¹ Data is not available for 1989 and 1990. During these years the Agricultural Department at Gaibank which collates information on bank lending was closed down.

² About G\$1000 million corresponds to the IDB 15% loan facility reactivation.

Gaibank is the third largest financial institution in Guyana and has a significant presence in rural areas. It provides medium to long term loans with a maximum of ten years. The interest rate on domestic currency loans now follows the prime lending rate. Loans in US dollars are repayable at a lower rate of 15%.

The nature of most of Gaibank's funding means that it is segmented into various loan programmes put up by the international institutions. These programmes carry specific conditions on terms and reporting requirements, which is a burden on the bank's limited institutional capacity.

2. Informal Markets

Given the limited availability of official credit, agricultural production operations through a number of different arrangements.

In the rice sector, where most operations are mechanised and the need to hire services, payment is often deferred until after the harvest. A high level of interest is charged by contractors who accept late payments. Millers will also extend credit to farmers for the purchase of agrochemicals at the beginning of the season, although the exact interest rate is not known. Gaibank estimates that the cost of these inputs in 1993 was about G\$5 500 per acre. Many millers claim they operate on a cash basis but this must be offset against the late payment often made to them.

Where farmers cannot raise the capital necessary to plant, they often turn to a larger farmer in the area. Rents vary but are often paid in kind, usually in terms of paddy per crop per acre.

There is scarce evidence of money lenders operating in the country. It is reported that they used to be many more but they believed that the rural areas meant that borrowers felt less obliged to honour the loans.

Other sources of credit are likely to be friends and relatives. Some farmers finance their production through their own savings as many do not deal with the banks.

devaluations in the late 1980s. Gaibank, which is administering the loan, has agreed to reschedule the loans but many millers remain highly indebted, limiting their ability to take out new loans.

The IDB 839 Loan has been partially successful: funds allocated to the rice subsector have all been committed but in the rice subsector only about 50% have been used. Devaluation has made field equipment very expensive and therefore opting for the cheaper option of buying imported second hand equipment cannot be financed under the loan. According to the dealers, a lot of equipment is available in the new equipment, but the difficulties farmers encounter in getting credit from the banks is the major factor limiting purchase. The dealers themselves have limited hire purchase service.

Thus the difficulty of obtaining credit combined with the high cost of agricultural equipment is making it difficult for producers to get credit.

3. Demand by Subsector

a) Sugar

As most cane production and all sugar processing is carried out by the nationalised sugar corporation, Guysuco, the maintenance of present operations is less of a constraint. However, Guysuco needs to invest very substantially in modernised factory equipment. The World Bank has made available some financing for this purpose but the amount of money is linked to a decision by the government on the future of the sugar industry.

b) Rice

Following government's divestment of all but one of its rice mills at the beginning of the 1990s, the rice industry is almost entirely private. Liberalisation combined with good weather in the last two years has led to increased production which reached 291 000 MT paddy (17.5% of total production). Devaluation has improved incentives for exporters and two thirds of the paddy was exported.

However, during the first crop of 1993, bottlenecks have appeared which may reverse the positive trend. Lack of investment in recent years has meant that paddy produced is not always of export quality nor is there sufficient equipment to deal with increased volumes of paddy. Large scale investment in drainage and irrigation to improve yields and quality and the modernisation of drying and storage facilities are the most critical needs. If the industry cannot make these investments it will neither achieve its potential for rice production nor will it be able to compete in the export markets in the EEC and in CARICOM where it is competing with low cost producers in South East Asia.

The National Dairy Development Programme has been working with the Agricultural Research and Development Institute (CARD) and the Institute for Cooperation on Agriculture (IICA) to develop improved forage production in the country. Given the characteristics of the sub-tropical forage systems that minimise land requirements. Some success has been achieved with a new forage grass. The major constraints are in marketing and to be able to make some medium term investments to improve production requires access to medium term credit facilities.

Improved cattle production would open up the possibility for export markets. Demand for imported beef is high in CARICOM but not for local cattle at all. Major investments in modernising the industry are needed to raise the levels of farm production and meat production. Initiatives are being implemented in the areas of animal health, particularly with regard to TB and

The poultry industry faces very different problems. It is a market that is highly dependent on imported inputs and it has therefore suffered from a trade deficit. Competition with US imports of chicken has driven down prices. In this situation, the industry is being forced to restructure and cut costs. Statistics for 1992 indicate that the domestic market has already started to be saturated by imported competition. However new investments, including research and development of improved produced feeds, may be required in the future if the industry is to retain its share of the local market.

d) Other crops

Guyana is self sufficient in the production of most fruit and vegetables. About 40% of total farmland was producing other crops of which 40% was under citrus and 24% was under citrus and bananas. There is great potential for export to CARICOM and even the US, but at present only pineapples are exported in significant quantities.

Efforts must be made to establish export markets. This will require several levels: in market research to identify market niches which are suitable; in varietal research and nursery development to establish what varieties are suitable for high quality production; and in improved production and marketing.

In addition to improving exports, producers should see to it that they are lowering their unit costs as well as consumer prices and increasing demand.

d) Repayment terms

Investment in capital works and equipment is by definition long-term activity. The returns to investment come over time and are realized on the basis of at least a five year project cycle. As described above, commercial banks in Guyana are more in the area of short-term loans. Short-term loans are rarely made for more than 2 years and are often the major characteristic of commercial bank liabilities which are short-term instruments.

as well as make some resources available to establish a policy recommendations for D&I, see D&I paper). If it benefit.

Government also needs to rationalise and make transparent and duties. The present uncertainty is a great disincentive and taxes are charged on imported capital items, the undermining the capacity of producers to secure loan exemption if granted to one producer gives him a non-competitive edge over his competitors, creating distortions and undermining limited resources in the economy.

Government also has a role to play in guaranteeing the particularly for export. In the rice sector, competition over a few years in supplying even traditionally protected markets to improve the quality of their product or face extinction a variety of factors throughout the production process are policies to ensure the highest quality at each stage (for 1

Government must also assist the development of new enterprises carrying out basic research on production and markets. Technical assistance is available to guide potential investors.

2) Subsidised Credit Schemes

One policy often favoured by governments seeking to support producers, particularly smaller producers who are excluded from international markets, is to make available subsidised credit, often through

In practice the performance of such schemes is often disappointing. It is a basic contradiction between the policy objective and the reality: cheap credit schemes are targeted at those producers who need it most: get credit. But the reason that these producers are often poor is precisely because they are poor risks. To offer cheaper credit is the opposite of sound financial practice: high risk borrowers pay higher market rates of interest not lower ones to compensate for such basic financial principles means that institutions offering such credit. The rates of interest charged do not even cover transaction costs of working with a high risk target group.

A related problem is that institutions providing subsidised credit are not commercial enterprises but extensions of government bureaucracy. This is because they are instruments of government's social policy. As lending institutions. They are not driven by market principles. Successful operation and profit is broken. As a result, a variety of opportunities for corruption and rent seeking develop.

Low-income people, with irregular streams of income, save high income in order to survive periods of low income. If they do not have access to the formal financial system, they hoard jewellery, building materials, livestock and other forms of wealth. This behaviour is understandable in countries where the economic return on such assets exceeds the rate of interest. In other circumstances, the absence of a savings facility and the selection of assets and is likely to lead to increased accumulation of liquid national savings.

By providing small producers with deposit facilities, banks can provide modest income from interest payments and, more importantly, a more liquid form. The customer also benefits from the costs of converting an illiquid asset into a liquid one.

More research needs to be done on the saving patterns of small producers to make an accurate assessment of the importance of extending deposit services. However this research should be a priority for governments concerned with rural finance: if it is shown that the illiquidity of rural savings hinders their mobilisation for productive investment in rural areas, then deposit services should be undertaken. One means of doing this is the Post Office savings account system which is already in place in many countries. An alternative might be to look into mobile banking facilities.

4) Improving Credit Programmes

The importance of extending deposit services to rural areas is supported by evidence from many lending schemes that once banks have established relationships with their customers, they are much more willing to make loans. A deposit account can act as security. On some schemes the deposit is a fixed percentage of the loan requested, effectively making the deposit a collateral for the loan.

Successful lending schemes have also used incentive schemes to encourage repayment of loans. In some, a client's chances of borrowing more are directly tied to prompt repayment. Some schemes offer a rate rebate for timely repayment.

Prompt repayment is also sought through the use of joint liability groups. The Grameen Bank has also successfully harnessed social pressure to ensure that clients repay.

RURAL DEVELOPMENT IN GUYANA

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1. INTRODUCTION

Guyana's population can be regarded as significantly rural, with a mix of coastal rural, near rural, riverain and hinterland communities.

In the late 1970 and 1980's, Guyana suffered a period of economic stagnation. This was marked by sustained decline in real incomes per head and a virtual collapse of the economic and social infrastructure.

Guyana's significant rural population has borne the brunt of economic stagnation. In rural communities, the more vulnerable segments have been particularly affected. In an IFAD/IICA report (1991), the Farm Household survey of 1988 identified six specific groups of rural population which are particularly vulnerable:

1. Wage labourers
2. Landless farmers
3. Small farmers
4. Households headed by women
5. Small fisheries
6. Amerindians

In addition to the six categories listed, the broad masses of the rural population constitute a vulnerable group. Berkley Stewart (1993) in a paper on 'Rural Development in Guyana' presented to the Institute of Development Studies, UG College, Georgetown, noted that during the past fifteen years, low economic productivity and heavy economic burdens have forced government to be constricted in meeting social needs. Poverty has become prominent in the society "particularly in the urban and rural areas of Guyana."

This paper proposes to address the problems facing four of the most vulnerable groups:

1. Small Farmers
2. Women - in particular women heads of households
3. Amerindians
4. Rural Youth

It also offers some recommendations which can be used to help in solving the problems of Guyana's rural poor within a framework of orderly Rural Development initiatives.

The small farm sector has the potential for greater contribution as a result of neglect in favour of larger farms, small farmers in the context of an uncertain land tenure system, deficient infrastructure - (in particular water control (drainage and irrigation) and low levels of income, inadequate credit facilities, scarcity or absence of essential inputs and lack of efficient support services such as research, extension and training.

IFAD (1992) listed the following six constraints which small farmers face:

- 1) difficult soil condition in many areas, e.g. in region #1 (the Demerara), the extreme of the wet and dry seasons particularly in the heavy clays, while the highly acid and toxic organic matter is unless appropriately treated;
- 2) problems with water control, drainage and irrigation particularly in the farm area and making it difficult to cultivate high valued crops;
- 3) insufficient family labour in some cases for cultivating large areas of spare parts and sharp increases in agricultural wages making the use of farm machinery (hired or purchased) and other inputs more expensive;
- 4) Low economic returns to farming as a result of: poor yields, high costs of transportation; marketing difficulties characterised by high marketing margins of intermediaries (huckster cost and difficulties in accessing credit (due to the current financial system, credit is provided by moneylenders at high interest rates);
- 5) scarcity or absence of essential production inputs (fertilisers, implements and planting materials) inhibiting the use of improved varieties and cultivation of higher valued crops; and
- 6) poor and inadequate institutional support services, extension and training.

2.1 Land Tenure and Farm Size

The land tenure system in Guyana consists basically of (i) owner operated, (ii) rental or lease of 21 years or more, (iii) rental used by others and (iv) other tenancy types. The main types, in frequency with which they occur are the owner operated and the leased for more than 21 years.

Credit facilities exist for small farmers. However, gaining access is especially for farmers who do not produce sugarcane or rice. In the 1980's, the positive impact of credit was reduced by devaluation, high inflation rates, price distortions and deteriorating conditions. Nevertheless, farmers who gained access to credit during that period benefited from a government policy of maintaining negative interest rates.

Since the 1980s, credit for small farmers became scarce when lending policies were tightened and decided to impose a requirement for a security collateral.

2.3 Technology and Productivity

With the exception of rice and sugarcane farmers, small farms are characterised by traditional labour intensive techniques with limited modern technology. Sugarcane and rice farmers have had access to extension services where this was lacking among other small farmers.

Other factors have also contributed to low levels of technology. Most agricultural inputs were imported by the Guyana National Trust Corporation (GNTC) and GUYSUCO and then made available to farmers through projects such as the MMA/ADA, Black Bush Polder and other schemes. Inadequate procedures, patronage and an inadequate distribution system have increased the cost of these inputs to small farmers.

Deficiencies in the extension system occasioned by staff shortages, duplication of activities and shortage of transportation also hindered the adoption of appropriate technology to small farmers.

Agriculture research in Guyana has made limited contributions to small farm productivity. Research concentrated mainly on traditional crops and livestock has been minimal. Research appropriate to small farms was generated. The IFAD/IICA report on Agricultural Research in Guyana said, "The outputs of research have not been visible to the farming community and the benefits to small farmers have been marginal". The weak linkages among the branches of extension - marketing also affected small farm productivity.

3. RURAL WOMEN

Women comprise over fifty percent of the population of Guyana. Their life expectancy is longer than men, their responsibility within society is complex and they spend more time expanding over a longer period of time.

1. **Need for Infrastructural Development**

The poor state of drainage and irrigation systems, recreation facilities and roads were identified as hindrances to those of their communities. The poor condition of roads were hindrances to women farmers taking supplies to the farm. The need to fetch water long distances affected children and reduced women's effectiveness in other activities.

2. **Social Welfare Needs**

Day care needs, housing, and shopping facilities and products were considered priorities for many communities.

3. **Production Oriented Needs**

The problems identified as having a deleterious effect on production were: access to credit; unavailability of critical agricultural inputs, pesticides and equipment; need to upgrade design and technology; outputs; lack of skills in business management, and access to markets in terms of penetration of the commercial sector and lack of information.

4. **Needs related to Education and Training**

'Education for living' was the way in which Jacks mentioned in this category. Examples cited were family planning, nutrition, and primary health care. The declining literacy among young women was also noted in addition to the need for library facilities and post secondary education and training in rural communities.

In addition to the broad categories of problems and needs identified in the survey, other needs and problems have been identified. The Coordinator of the Women's Affairs Bureau, cited problems of land and property rights among women and the discriminatory laws. She also refers to the need for consciousness raising and confidence among women engaging in business and training concerning Women's roles and participation in the various development projects. A community planning mechanism be used to strengthen planning mechanisms was also identified.

little technical assistance of any kind is provided to these credit and other inputs have not been generally available group. Produce assembly points and markets are often located and for most farmers, are difficult and very expensive to reach

Problems of what geographers term 'distance decay' communities. They are characterised by such phenomena as degradation of water supply, forest and game reserves, ineffective and inappropriate education, alienation of land, and liquor, labour exploitation and prostitution.

Traditionally, shifting cultivation, fishing and to some degree related activities and handicraft production were the primary activities of these communities. The economic hardships experienced by many have led many to seek alternative means in other communities or neighbouring countries, to earn their livelihoods. Men, especially, have been leaving the communities in large numbers to seek work in the extractive trades. While they have engaged in this period of economic decline and structural adjustment has been a period of true extent of which is yet to be accurately measured. This has placed an additional burden on the women, who, in addition to their reproductive responsibilities, have to take responsibility for managing the household.

The men who leave their communities to work outside, often in exploitative relationships. In a historical review of Amerindian communities (1993) wrote:

"They worked for licensed and unlicensed woodcutters for diamond and gold seekers in all of which cases of exploitation have been documented".

In addition to the exploitation, the men themselves suffer and the women and children left behind, receive very little benefit. Preliminary investigation conducted at Moraikoba reported that most of the money earned by men is spent on alcohol and very little of it returned to the village.

The Amerindian communities traditionally have been self-governed and represented by an elected Captain (Touchau) and Council. These structures are weak and increasingly so, due to the erosion of traditional structures in the past, many actions by intervention agencies, both government and non-government, were not supportive of the Amerindian self-worth or self-development of their communities. There was instead a process of institutionalising a dependency syndrome, emasculating traditional structures and creating widespread demoralisation in the communities. Although most communities have natural resources and potential for developing leadership skills, these persons have had little exposure to the basic principles of community development, management, marketing practices, available technologies and others.

1. There was no written policy on youth employment.
2. No significant youth employment programme exists i
3. No special guidelines exist for the involvement of activities.
4. No access by young people to agricultural developme state land, bank loans etc.
5. Health care is less readily available in rural areas as
6. Poor access by rural youth to critical areas of educat

The rural youth in Guyana as can be seen, is faced with severe his/her control. The social institutions charged with the responsibility of catering for the needs of youth have all been affected by structural adjustment policies.

The family, for example, which is central to the life expectancy of the most constraining factors on youth development in the have been forced to seek alternative and additional means of such alternatives have been the cause of fracturing of families. Some households leave sometimes for extended periods to seek employment others not so successful. Some leave forever creating the abandoned and children (already referred to in previous sections), all of effects on the youth - resulting in youth being caught up in bad behaviours.

Other social institutions, such as schools and other educational agencies, private & public and businesses, have also been affected by the conditions and opportunities which will allow them to r

6. INITIATIVES TO COMBAT PROBLEMS AMONG VULNERABLE

A number of efforts have been made by private (NGO) organisations to address the needs and problems of Guyana's

With respect to the agricultural sector, the Government programmes during the 1970's and 80's which indirectly affect farm income and rural unemployment. Such programmes include the Small Scale Food Crop Programme which was instituted in 1983 was designed to improve the lives of small scale food crop farmers. Six Rural Marketing Centres were funded in 1983 but except for the Mibicuri centre, all

Other Agencies such as Guyana Federation of Women's Institute, Anglican Mother's and others have also assisted these and other initiatives, while useful, still fall short of meeting the needs of the masses of rural women.

Numerous efforts have also been designed to alleviate poverty. The establishment of the Hinterland Affairs Department (1982), the Ministry of Rural Development and, more recently, the appointment of a Minister of Rural Development were initiatives implemented by successive governments to address the needs of Amerindian communities. Efforts by agencies such as the Beacon Foundation, GOIP, APA, SIMAP, FUTURES Fund and IICA and others, have all met with varying degrees of success.

Of the four groups which are addressed in this paper, the youth are the least well served by concerted developmental efforts. The youth development programs of the Ministries from Office of the Prime Minister to Education to Labour and Human Services are a result of efforts to deal with problems of youth and an obvious area of importance and position in society. Efforts by the Central Government and regional officers must be commended. They have mobilized human and financial resources. The Commonwealth Youth Centre located in Guyana has provided reasonable support to the youth of the country.

Special mention needs to be made of the SIMAP Agency which was established as part of the Economic Recovery Program under the Structural Adjustment initiative in the late 1980's.

The Social Impact Amelioration Programme (SIMAP) is an agency and was established in 1989 to assist in cushioning the impact of structural adjustment on the most vulnerable sections of the population. It is one of the "damage limitations" of the structural Adjustment Program which are on-going, encompass social services and infrastructure and institutional strengthening.

FUTURES Fund is a Government of Canada/Government of Guyana programme to assist people of the country to improve their standard of living. The fund supports priority projects in such areas as rural and rural enterprise development and employment creation. Income earning opportunities for women are also supported by the fund. The fund also addresses rural and urban infrastructural improvements.

Recommendations

To seek to address the needs and problems of the vuln following recommendations (Figure 2) are offered:

- a. A national Coordinating Committee (NCC) be established. This committee will compri agencies and representatives of local comm for coordinating national rural developme
- b. Regional Coordinating Committees (RCC) the umbrella NCC will also be formed. local community committees to formulate
- c. The immediate tasks of these committee information for rural development. Com be evaluated and information on lessons development of the data bases.
- d. On-going projects will be modified as ne of project will be documented and u projects.
- e. Profiles of selected communities inclu availability, needs and problems will al Rural Development data base. Cor formulated.
- g. The information contained in the data new projects which will be implem monitoring and evaluation assistance
- h. Experiences and results of project w development practitioners at annual f newsletter, publications and diverse
- i. Experiences gained and informat strengthening the NCC and RCCs strategy for Rural Development frc Rural Development will be elaborat

This plan will serve to coordinate and integrate community based rural development agencies le development Projects and stronger communities.

Within the ambit of this general recommendation and have been obtained which indicate that most problems are common to rural areas. Suggestions are offered for consideration for possible projects identified.

1. Infrastructural development and rehabilitation.
2. Improvement of Rural Financial Services in Rural Communities.
3. Provision of and access to appropriate technology.
4. Generation of data required for Rural development.
5. Strengthening education services in rural communities.
6. Development of Amerindian skills in Community Development.

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its broad objective, the acquisition of all documents relating to agricultural research on Guyana. Its functions among others were:

- to promote research and to ensure the application of the results of scientific and technological activities to the development of agriculture, industry and social welfare in Guyana;
- to collect and disseminate information relating to scientific and technical matters, and to publish reports and papers and hold conferences on scientific and technical matters.

Other attempts made in the development of agricultural information systems and documentation centres were recorded by Stephenson (1977)⁶; King (1977)⁷; Gamboa (1980)⁸; University of Guyana (1980)⁹.

In 1978 the Government of Guyana established a National Commission on Libraries and Related Services which was charged with the responsibility of recommending to Government a programme for the overall development of the country's information infrastructure.

In September 1980, a proposal was submitted by the Ministry of Agriculture¹⁰ to IICA and IDRC for the establishment and maintenance of a basic infrastructure at the Central Agricultural Station's Library so that the Ministry could participate in the transfer of information not only to technicians at the Station but to all those in the agricultural sector.

In 1981 Arboleda-Sepulveda³, a UNESCO Consultant was appointed to review the development of an Agricultural Information Network in Guyana and the establishment of an Agricultural Documentation Centre which would cater for all levels of information consumers within the country.

Other reviews also examined the strengthening of the information and documentation systems of the Central Agricultural Station of the Ministry of Agriculture in Guyana and included proposals for the establishment of an agricultural library/documentation service.

In 1988, Durrant^{11,12} working under the mandate of the Government of Guyana and the FAO prepared two documents - *Proposals for Development of a National Agricultural Information Network* and *Assistance to the National Agricultural Research Institute (NARI): Establishment of a Documentation System* respectively. In these reports, Durrant reviewed the patterns of information resources management, the proposed National Agricultural Information Network (NAIN) and presented an action plan for the implementation of the NARI Library and Documentation System so that it would be able to execute the onerous responsibility as the National Agricultural Information Clearing-house for the country.

All the papers reviewed have the same commonality: the management of agricultural information so that it can be retrieved with ease and disseminated to its target audience.

3. AGRICULTURAL INFORMATION SYSTEMS IN GUYANA

An information system may be defined as a process involved with all aspects of handling information. In Guyana there exists a number of information systems. They are either global or regional. The establishment of a national information and documentation system is actively being discussed and this may afford NARI the opportunity to make some contributions to its operational logistics. The operating information systems are as follows:

3.1 GUY-AGRIS

Guyana's - International Information System in the Agricultural Sciences and Technology is a subset of the regional information system, the Caribbean Agricultural Research Information System (CAGRIS) and the global International Information System in the Agricultural Sciences and Technology (AGRIS). At the establishment of AGRIS in the mid 1970s in Guyana, the University of Guyana (UG) was appointed the National Focal Point (NFP). On the establishment of NARI in 1985, this NFP responsibility was transferred to the NARI Library and Documentation Centre. AGRIS' national responsibility is to collect bibliographic information of agricultural documents/publications generated relating to the country's agriculture, process them and transmit the bibliographic information to the AGRIS Processing Unit at the International Atomic Energy Agency (IAEA) in Vienna.

3.2 GUY-CARIS

Guyana's - Current Agricultural Research Information System is also a subset of the CARIS-CARIBBEAN and the global Current Agricultural Research Information System (CARIS). Its responsibility is to keep accurate records of current agricultural research being conducted in the country. Information on current agricultural research is collected using the CARIS data collection forms. The information is processed to generate directory information about on-going research projects in the country.

The two information systems mentioned above (AGRIS and CARIS) are coordinated by the FAO headquarters in Rome. Besides the submission of inputs to the AGRIS and CARIS processing units, NARI Library and Information Centre as the NFP, participates in the Joint AGRIS and CARIS Technical Consultation held every two years since 1990.

3.3 AGRINTER

Inter-American Agricultural Information System for Latin America and the Caribbean was established by IICA in 1972 as a mechanism which includes the dissemination of technical-scientific information and documentation. The main objective is to create the institutional capacity in the countries to improve the agricultural

information and documentation services. AGRINTER was to be strengthened through its linkage with and integration into the world-wide agricultural information system, AGRIS. The coordinating Centre was Inter-American Centre for Agricultural Documentation, Information and Communication (CIDIA) at IICA headquarters in San Jose, Costa Rica. Each participating country has a national node through which the coordinating centre exchanges agricultural information. Guyana joined AGRINTER in 1982 and the UG at that time was nominated as the NFP. With the integration of AGRIS and AGRINTER in 1985, the latter became non-functional.

3.4 INFOTERRA

Information System on the Environment is a decentralised network of sources of environmental information linking national and international institutions and experts in a cooperative venture to improve the quality of environmental decision making. It monitors, assesses and disseminates information on the environment. It delivers information on the environment through on-line bibliographic searches, document delivery, special sectoral data compilation and source referral. Results of research conducted or monitored reports on the environment are among the information delivered. Focal points are at the national and regional levels. NFPs are Government designated centres. INFOTERRA was initiated in 1989 in Guyana and the NFP is the Institute of Applied Science and Technology (IAST).

3.5 CARAPHIN

Caribbean Animal and Plant Health Information Network was established after a feasibility study on Animal Health Information and Data Monitoring System for the CARICOM Member States and Suriname was concluded. On the basis of that study, a four-year project developed by IICA titled "Survey and Monitoring of Animal and Plant Diseases and Pests to Facilitate Increased Production Efficiency in the Caribbean" was developed. The goal of the project was to organise and implement an animal health and plant protection information and data monitoring service in the Caribbean; to improve the exporting capabilities of Latin America and the Caribbean (LAC) countries by assisting them to provide quality information on their products; to assist LAC countries to increase productivity by reducing the impact of sanitary problems; to help protect the agricultural industries of LAC countries by providing access to the best information available on the agricultural health status of other countries. This information could be used to prevent the introduction and establishment of exotic diseases and pests by strengthening agricultural emergency and quarantine services in the countries. Based on these, the Guyana CARAPHIN NFP was established at the Ministry of Agriculture in 1990 to process animal and plant health information for input into the network. CARAPHIN Headquarters is located at IICA, Trinidad & Tobago.

3.6 CAB INFORMATION SERVICES NETWORK

Guyana, for many years, has been involved in the CAB Information Services Network. This network is achieved through the subscription and distribution of the CAB abstracts. The CAB Information Services acquire relevant scientific and technical literature on agriculture and allied disciplines from all over the world for abstracting and indexing. Through these abstracting and indexing services, agricultural research information from one country is made available to other countries. NARI, through the Crown Agents, is responsible for the purchase of the abstracts. At present Guyana's quota allocation made up of 30 titles is 43 copies. These abstracts are posted directly to NARI from CAB International. NARI, upon receipt, distributes the abstracts to members of (The National Agricultural Information Network (NAIN) according to their subject specialisation.

3.7 TECHNICAL CENTRE FOR AGRICULTURAL AND RURAL COOPERATION (CTA) QUESTION AND ANSWER SERVICE

A question and Answer Service was established by CTA within the African, Caribbean and the Pacific (ACP) countries to help their agricultural information needs. Services offered include bibliographic searches, supply of factual data or documents (original or photocopied) and technical advice on various agricultural or rural development topics. The Question and Answer Service supplies information on agronomy, training and extension, rural economics and sociology, crop and animal production, forestry, fisheries, agricultural mechanisation, natural resources, food and nutrition and the environment. Regional focal points were designated and that of the Caribbean is the Caribbean Agricultural Research and Development Institute (CARDI) headquarters, St Augustine, Trinidad and Tobago. Participating countries designate their own NFPs. The NFP for Guyana's CTA Question and Answer Service is the NARI Library and Information Centre and the contact person is the Librarian of the Institute.

3.8 PROCITROPICOS

This network of research institutes was developed by IICA in collaboration with eight South American countries of the Amazon Basin to serve as a mechanism in carrying out cooperative activities in research and transfer of agricultural technology in the Amazon basin. Participating countries are Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela. There is an agreement among member countries to operate cooperative programmes on research and technology transfer for the South American Tropics. Its general objective is to promote and contribute to sustainable agricultural development of the sub-region through the efficient use of renewable natural resources and by offering a true alternative for economic reactivation and increased biological and physical productivity in the future.

Proposed actions involve cooperative research, scientific and technological exchange, training, information and documentation, and specialised technical assistance to upgrade the quality of research and technology transfer. It operates through the following sub-programmes:

- agroecological resources;
- production systems;
- genetic resources, and
- information systems.

There is a regional focal point based in Brasilia. NFPs are designated by participating countries. Guyana's NFP is NARI and a contact person for the country is the Director.

Through NARI's direction and coordination, other institutions within the NAIN, will serve as links to other regional information systems in which the country is logically a member but not actively participating in information interchange. Examples are the Guyana Marketing Corporation's (GMC) participation in the Caribbean Marketing Intelligence Service (CAMIS) and Caribbean Trade Information System (CARTIS). Included also is the Fisheries Department participation in the Caribbean Technical Cooperation Network in Artisanal Fisheries and Aquaculture.

Also through NARI, NFPs for the following regional information systems will be nominated. These are:

- Caribbean Network for Integrated Rural Development (CNIRD);
- Caribbean Energy Information System (CEIS);
- Caribbean Science and Technology Information Network (CARSTIN);
- Caribbean Patent Information Network (CARPIN), and
- Caribbean Agricultural Technical Information Service (CATIS) .

Besides institutional participation in information systems and networks, agricultural scientists also belong to international and regional professional bodies and networks. Through the scientists' participation in the activities of these professional bodies, information flows into the national information system to enhance agricultural research and production. Examples of such networks in which some of the nation's scientists are participating are: the Caribbean Biotechnology Network (CBN); Technical Cooperation Network on Caribbean Plant Biotechnology (REDBIO); and the Caribbean Rice Improvement network (CRIN).

4. NATIONAL AGRICULTURAL INFORMATION NETWORK (NAIN)

Faris, (1991)¹³ perceived an agricultural network as a group of individuals or institutions linked together because of commitment to collaborate in solving a common agricultural problem or set of problems and to use existing resources more effectively. This definition includes scientists, technicians, extension workers, documentalists, information specialists and farmers, institutions, government agencies and agribusiness enterprises.

From the literature reviewed, the proposal for the establishment of NAIN was first made by Arboleda-Sepulveda³ in 1981 in his consultancy report: *Sharing Agricultural Documentation and Information in Guyana*. Seven years later, Durrant (1988)^{11,12} made the same proposal in her reports.

There is no doubt that much agricultural information is generated in Guyana but lost through improper recording and organisation. The establishment of a well coordinated and managed NAIN can reduce if not prevent this loss. As information needs of members of the agricultural community differ, the network when in full operation is expected to cater for the needs of these varied groups and be the national agricultural information component of the National Information System. The establishment of a National Information and Documentation System is presently being discussed by the Guyana Library Association (GLA) and the Government.

To enhance access and bibliographic control within the Network, Arboleda-Sepulveda³ proposed the Central Agriculture Station at Mon Repos as the coordinating body of the network. After the establishment of NARI, the Central Agriculture Station Library became the NARI Library and Documentation Centre. Durrant in her reports also proposed that NARI be made the main point of access and the clearing-house for the information held and produced within the agricultural sector in the country.

One reason is that this would avoid the multiplication of subscription for the same journal titles in the network. This is particularly important at this period when governments worldwide are reducing spending on libraries. Such a reorganisation will also help to optimise the use of scarce research journals since purchase of needed journals can then be more widespread catering for more subject interests.

NARI currently has a database of its library holdings called NARIL and has already defined facilities for the construction of a **DATABASE UTILITY** for the network when it becomes fully operational. With the NARIL database, NARI should have bibliographic records of all library holdings of the institutions in the Network with location information so that an information seeker searching the database utility will know which institution has the document being sought.

NARI will advise on the library organisation of the NAIN member institutions and train staff who will manage these libraries. The network is expected to support research activities of the institutions within NAIN by providing information on related research conducted and to identify any duplication using the available information system - CARIS. External linkages of the network within the region will also help in providing relevant data on the research to be conducted .

A simple graph (Fig. 1) to depict the structure of the network is presented as a wheel-like structure showing the coordination hub in the centre, spokes linking the nodes (a) and the rim joining the nodes (b)

5. INSTITUTIONS RESPONSIBLE FOR THE GENERATION OF INFORMATION WITHIN THE NETWORK

The institutions responsible for the generation of information within the network can be categorised into two groups: a) governmental/non-governmental b) bilateral agencies.

5.1 Governmental/Non-governmental Agencies

This group provides a wide diversity of services and includes:

- Agricultural In-service Training and Communications Centre (AITCC)
- Demerara Timbers Ltd
- Farmer cooperatives
- Forestry Commission
- Guyana Agency for Health Sciences, Education Environment and Food Policy (GAHEF)
- Guyana Agricultural and Industrial Development Bank (GAIBANK)
- Guyana Marketing Corporation (GMC)
- Guyana Natural Resources Agency (GNRA)
- Guyana Rice Export Board (GREB)
- Guyana Rice Milling and Marketing Authority (GRMMA)
- Guyana School of Agriculture (GSA)
- Guyana Export Promotion Council/Board
- Guyana Geology and Mines Commission
- Guyana Museum
- Guyana National Trading and Engineering Corporation
- Guyana Manufacture and Industrial Development Association (GUYMIDA)
- Guyana Sugar Corporation (GUYSUCO)
- Institute of Applied Science and Technology (IAST)
- Livestock Development Company (LIDCO)
- Ministry of Agriculture:

- a) Planning Unit
- b) Fisheries
- c) Wildlife Services
- d) Lands and Surveys
- e) Hydrometeorological Services
- f) Hydraulics Department

- Mahaica-Mahaicony-Abary Agricultural Development Authority (MMA-ADA)
- National Agricultural Research Institute (NARI)
- National Archives
- National Bureau for Standards
- National Dairy and Development Programme (NDDP)
- National Edible Oil Company Ltd. (NEOCOL)
- National Library
- National Paddy and Rice Grading Centre (NPRGC)
- Rice Producers Association (RPA)
- Seals and Packaging Industries Ltd. (SAPIL)
- State Planning Secretariat

- University of Guyana (UG):
 - a) Library
 - b) Centre for the Study of Biodiversity
 - c) Smithsonian Institution
 - d) The Environment Unit
 - e) The Faculty of Agriculture

The research activities of the programme will be linked to research programmes being undertaken between UG and other institutions such as :

- the University of Utrecht
- the TROPENBOS Guyana Project
- the Flora of the Guianas Project
- the New York Botanical Gardens
- the Smithsonian Institution (which has a resident botanical Collector in Guyana)

These institutions will be responsible for the collection of base data and other inputs to be fed into the information network.

5.2 Bilateral agencies

These agencies sponsor research and development projects or provide consultancy in agricultural and related fields. They comprise the following:

- British High Commission
- Canadian High Commission
- Caribbean Development Bank (CDB)
- Caribbean Agricultural Research and Development Institute (CARDI)
- CARICOM Secretariat
- European Economic Commission (EEC)
- Inter-American Institute for Cooperation on Agriculture (IICA)
- International Fund for Agricultural Development (IFAD)
- Regional Education Programme for Animal Health Assistants (REPAHA)
- United Nations Development Programme (UNDP)

6. INFORMATION FLOW WITHIN THE NETWORK

The flow of information as identified is primarily through the production of agricultural documents. These documents which constitute mainly "grey" literature are difficult to locate because of their little known existence. Earlier arrangements for information dissemination and transfer were through *The Journal of the Board of Agriculture* which was published up to 1920s and later under other such titles as *The Agricultural Journal of British Guiana* which was published up to 1930 and later the *Farm Journal*. Other publications were the *Guyana Journal of Science* and *Timehri* which have long ceased publication. *Agricultural Research Guyana*, is the most recent and the only survivor in this category. It was last published in 1987 but efforts are underway to publish volumes for 1988 to present by NARI. *The Sugar Bulletin*, in the 1970s changed to *Guyana Sugar Experiment Station Bulletin*, is still being published. Since these periods, there has been an exponential growth in the rate of agricultural publications in Guyana both by Government and private organisations. Besides the publication of journals, agricultural bibliographies were compiled by various compilers as indicators to literature in the areas they cover.

Notable are bibliographies by the Wisconsin University, Land Tenure Centre (1972)¹⁴; the Ministry of National Development and Agriculture (1973)¹⁵; Chesney and Gordon (1973)¹⁶; Cooper (1974)¹⁷; Harry and Alonzo (1975)¹³; Kennard (1975)¹⁹; Knee (1978)²⁰; Jameson (1977)²¹; Strum and Goodland (1978)²²; Benjamin (1979)²³.

The development of NAIN will facilitate the flow of information within the agricultural sector. This information flow will not only be in the form of print and non-print but involve the exchange and use of institutional experts who will address particular agricultural problems. At present, NARI's scientists are involved in teaching programmes at UG, REPAHA and GSA.

Information to be disseminated comprise results of research, production, export and meteorological statistics. Logistic support for information will be through the appointment of contact persons by the institutions participating in the network through whom access to information from the central node is gained by the institutions concerned and input of information into the central node is achieved by the participating institution. A graphic representation of the flow of information is shown in Fig. 2. The pattern of information flow will be determined by the type of information generated and links established between network institutions and the central node; and between the intervening nodes and also the consumption forces impacting on the flow of this information.

Four levels of information generators and consumers have been perceived. These are:

- a) research level - those involved in finding new ways of agricultural production and marketing;
- b) extension level - predominated by extension officers;
- c) farming level - all those involved in the production of food;
- d) trade level - made up of administrators, policy makers and agri-business community.

The agricultural institutions as listed earlier constitute the generators and also consumers of agricultural information as in the above listed levels. Information generated is in the form of research and quantitative data relating to production and marketing of agricultural products. Quantitative data relating to meteorological conditions under which crops are to be cultivated are also among the information generated.

Information generated from institutions (both public and private) is sent to the central information processing node through the institutions' contact persons. The information is processed and products disseminated in the form of indexes, abstracts, bibliographies, directories, current awareness bulletins, catalogues, current contents, brochures, factsheets, research highlights, flyers and statistical data. The information is then transmitted to the various levels of users identified through print, radio, television, conferences, seminars, training etc. Information not properly analyzed and packaged is sent back to the processing centre and points of generation. This presents a matrix of relationships which will exist within the information network.

In the whole information transfer matrix, the extension level is considered the most critical because it is the gateway through which improved technologies in agricultural production reach the farmer. The extension infrastructure, however, is perceived to be weak. Its complete reorganisation and integration with other information centres and libraries could improve services.

Services to be offered will comprise:

- access to the data base utility;
- reference service including retrospective searches;
- selective dissemination of information (SDI);

- Current awareness service (CAS);
- referral service;
- user orientation service;
- training and visit;
- enquiry service;
- document delivery service;
- reprographic service, and
- identification of external sources of information

Under an ideal system, NARI, as the central node of agricultural information, would act as the central deposit centre for agricultural information materials generated within the network. To make this more effective, the legal deposit regulation should be revised to make it mandatory for institutions within the network to deposit three (3) copies of relevant information, both published and unpublished, with NARI. This legal deposit regulation should form a part of the legal instrument establishing the National Information and Documentation System.

Since its creation, NARI, has established bilateral protocols with agricultural institutions in Venezuela, Brazil and Suriname. These institutions send publications to NARI on gratis, but the only handicap is the translation of these documents. This problem of translation notwithstanding, the relationship should be encouraged.

Besides the institutions within the NAIN, Government, as needs arise, may establish information networks through projects. These projects can work under the coordination of the NAIN NFP. An example is the Biodiversity Network which will help organise the nine (9) Guyanese-Amerindian tribes into a cooperative network for the conservation and sustainable use of biodiversity (Carberry, 1993)²⁴. All information materials generated from this project should be made available to NAIN. This will be processed and sent to the NAIN member institutions.

7. MECHANISMS FOR THE TRANSFER OF INFORMATION

The oldest, fastest and most effective information transfer method is oral communication. However, impression while not permanent has nonetheless helped in information transfer process. One of the greatest problems identified in Guyana's agricultural sector, as earlier stated, is the transfer of information from point of generation to all levels of information consumers mentioned earlier, but especially to the farming level.

Agricultural Research information is critical to any agricultural production and should therefore be given a position of importance in the "order of things". Unutilised research results are wasted public investment (Stuart, 1989)²⁵ which upholds the truism that research does not benefit society unless it makes a positive impact on the lives of its target users.

The agricultural research information transfer should not be seen as the sole responsibility of the extension services alone but a cooperative and collaborative responsibility of researchers, extension officers, information specialists, documentalists, librarians and farmers all working towards a common goal. Extension officers should spend some percentage of their time in the channelling of agricultural information to whichever of the levels it is needed. All generated agricultural information should be properly analyzed, synthesised and packaged in the most consumable form, taking into consideration the target audience to which the information is meant. Properly processed information leads to increased agricultural production while improperly processed information leads to wrong applications resulting in agricultural disasters. Guyana is more than 90% literate, and therefore information transfer materials will circulate to a large number of rural farmers. The information however will need to be packaged accordingly to suit the varying categories of persons who need information on agriculture.

After the information has been properly processed and packaged, then relevant communication media in the country can be mobilised for the dissemination, again taking into account the audience for which the information is intended. Effective means of information dissemination may include conferences, meetings, seminars, symposia, workshops, field-days, panel discussions, consultations and training and visits. Other means of reaching potential users are through the radio, television, telephone and print media. Of all these, the print medium is the most permanent information carrier which has stood the test of time and will contribute to do so for many decades into the future. Through the print medium, institutions publish research advancements and other information in the form of journals, reports, bulletins, factsheets, magazines, research highlights and brochures. Verbal communication through on site training, seminars, workshops, etc. remains the more effective way of transmitting information, especially to the rural population as questions can be asked to clear doubts and ambiguities. In industrialised countries and increasing so in developing countries, agricultural information is exchanged between distant locations through mass data transfer carried on telecommunication systems.

8. PROBLEMS

The delay in the implementation of the NAIN is due to diverse problems identified and categorised as follows:

- human;
- physical;
- financial;
- development in electronic information management, and
- miscellaneous.

The profession of library and information management is not new in Guyana but it has not been able to attract many enthusiasts because it is not as popular a profession as engineering, medicine, law or accountancy. The shortage of information specialists and librarians is even more aggravated by a perceived low professional status accorded them. In the English-speaking Caribbean, only the University of the West Indies (UWI) has a library school at its Jamaica campus. This has also contributed to the existing problem. Libraries seem to have lost much recognition and prominence in the Guyana society and when budgets are cut the libraries appear to be the first to be affected. These have all been responsible for the low interest people show in pursuing the profession. Because of the shortage of librarians in the country, most libraries of the institutions which would form the National Networks (NAIN) are unorganised. Within the last three years, the country has lost about six (6) librarians through migration.

The potential and relatively low cost of electronic equipment have attracted and fascinated many users both in developing and developed countries. Because of this attraction, some institutions have purchased electronic equipment without consideration for the physical environment where such equipment will operate. This often results in short life of the equipment. Because of the nature of the weather in the tropical environment, dust particles coupled with high temperatures and relative humidity easily affect electronic equipment. Electronic equipment therefore should be operated in an air-conditioned environment. The provision of air-conditioners will incur additional expenditure on an already impoverished library thereby worsening an already bad situation.

Another problem hampering development programmes is a lack of adequate finances. Because of Guyana's peculiar economic status, it has not been possible for Government to provide the physical and infrastructural facilities that institutions within the network need and also remunerate the country's librarians appropriately to retain them. The problem of finance has made it difficult to purchase agricultural information materials for the libraries, especially journals.

Some institutions have already introduced computers to upgrade their library and information systems some are yet to introduce computers. Computer introduction in some development circles may be viewed with fear. Some librarians and information specialists feel most uncomfortable with this new development.

Other factors have also contributed to the non-implementation of the network system and inadequate publicity given to agricultural development. Some of these are: the under-utilisation of the information dissemination media found in the country for reaching out to agricultural information consumers especially farmers; absence of a national information policy, and non-compliance or non-existence of the legal deposit law which would control the circulation and distribution of agricultural information in-print in the country. The telephone network in Guyana is being refurbished but some institutions in the network including NARI are not yet linked. This has resulted in serious limitations

in NARI's services to agricultural information seekers. There is no doubt that NARI's services will be much improved with the refurbishing of its telephone system. Other responsibilities as the national node for agricultural information management and NFP for some information systems will be properly executed.

9. COMMENTS AND RECOMMENDATIONS

Previous consultancy mission reports and individual reports suggested ways to establish a well constituted agricultural information infrastructure in Guyana. The non-compliance and non-implementation of these suggestions have been responsible for the delay in the establishment of a properly organised and managed information network. Notwithstanding, it is being recommended that the following measures be given urgent consideration:

1. that the NARI Library and Information Centre continues with its NFP responsibility of the NAIN as earlier proposed by other authors;
2. that the NAIN be formally inaugurated and contact persons for the NFP appointed in each institution participating in the network;
3. that a documentalist be employed at NARI to be solely responsible for coordinating the activities of the NAIN;
4. that the legal deposit law be revised making it mandatory for all agricultural and allied institutions in the country to deposit three (3) copies of published or unpublished materials with NARI;
5. that the NFP for NAIN encourages full legal compliance and all agricultural materials generated are acquired;
6. periodic visits by NARI to the institutions of NAIN to assist in ensuring that all on-going research projects are properly recorded;
7. all institutions in the NAIN send monthly bibliographic lists of materials received to be input into the utility database for processing and subsequent printing out and circulation to NAIN members on the basis of CAS;
8. a directory listing of agricultural researchers, agri-business enterprises and agricultural entrepreneurs be kept at the NFP in NARI. This will help identify subject or business profiles of researchers and business entrepreneurs so that information services can be easily extended to them on the basis of SDI. The directory information will also help to contact particular researchers or business entrepreneurs when problems that need attention and advice arise. The methods of SDI and CAS will help sensitize the agricultural information user on the importance and need of the library/information centre so that it can be more effectively utilised;

9. the Extension Liaison at NARI and AITCC should work closely together with the libraries and information Centres already existing in the NAIN in the production of well packaged extension materials for farmers. A desktop publishing system has been established in NARI and the appointment of a publications officer will help in realising this goal;
10. the recommendation of the *National Workshop on Linkages between Agricultural, Technical Training, Research and Extension in Guyana* held 1991 Dec. 9-13 at NARI headquarters, Mon Repos should be implemented without further delay; The recommendation among other things suggested that:
 - Research-Training-Extension (RTE) system in the country should be decentralised with the grassroot level extensionists to be under the control of Ministry of Agriculture and fully coordinated based on the present Regional system;
 - an Agricultural Council be formed which will be responsible for the formulation of agricultural policies, planning, monitoring and evaluating programme implementation;
 - there should be farmer participation in programme development, formulation of agricultural policy and identification and solution of problems;
 - a farmer driven systems methodology in which farmers participate in the identification of needs and their solutions and in work-programme development should be encouraged;
 - goal and out-put of the system must be clearly defined by measurable parameters, and each activity being 'projectised';
 - external and internal linkages be identified through the adoption of Holistic Systems Approach which ensures farmer participation and training at all stages and levels of RTE system in systems methodology, social environment awareness and overall methods of technology transfer²⁶.
11. those involved in information generation, processing and transfer should spend a percentage of their time with the farmers to ensure that research results and technology adaptation are being exploited to the maximum;
12. all institutions within the NAIN should be connected with telephone services to facilitate communication between and among network members;

13. electronic equipment to be used in the information network must be maintained and sustained with facilities within the country;
14. the authorities at the UG should consider seriously the establishment of a library school to train librarians for the national system;
15. salaries of librarians and information specialists should be revised upwards to retain the existing librarians and also attract others into the profession;
16. Government should consider setting up a three-year development project for the establishment and operation of the NAIN. Financial resources should be sought from local business entrepreneurs in the network and multinational agencies. Experts should be locally recruited.

10. CONCLUSION

Some development is taking place in agricultural information management in Guyana but much more needs to be done to have an effective system. These are dependent on funds and commitment of those in the agricultural sector.

There is no time as appropriate as now for the Government to consider the issues raised above and establish and implement a working information network for agriculture in Guyana. This will not only help in the promotion of increased agricultural production and so enhance Guyana's position in both the Regional and International export markets, but also further encourage greater participation in farming to ensure national food security and export capacity.

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GENERATION AND TRANSFER OF TECHNOLOGY IN GUYANA - A SYSTEMS APPROACH

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1. INTRODUCTION

The Generation and Transfer of Technology is a process for moving technology from the producer of the technology to the user. It is assumed that the user derives some benefit from the technology. The consumer will, however have to be convinced of the usefulness of the technology before it is adopted. The transfer process therefore hinges on effective communications. Other factors will also determine whether the technology is useful and whether it will be adopted. These factors are related to the physical, social and economic conditions existing at the time.

The methods used to generate and transfer technology is also dependent on the physical, social and economic conditions. The objectives of the process are defined by these conditions and its success would therefore be related to an understanding of them. Since the achievements are obtained and the evaluations made at some point in the future, where conditions may be different from those which influenced the definition of the objectives, the problem becomes that of selecting an approach which uses resources efficiently and is flexible to changing conditions.

A brief description of the systems approach to generating and transferring technology is given here. It is proposed that this methodology be adopted for Guyana and networking is suggested as an effective method for coordinating activities.

2. THE SYSTEMS APPROACH

The physical, social and economic environment comprises a set of systems. The components of each system can also be regarded as sub-systems. The organization of these systems and their linkages determine how changes in the sub-systems affect each other and the whole. This is the basis for the systems methodologies. This methodology facilitates the definition of the sub-systems, their linkages and the outputs so that the effects from changes to any of the components can be measured. The systems are treated in a holistic way.

The Systems Methodology

Stages

In general the methodology has four basic stages as indicated below:

- a. Description and characterization of the existing systems and sub-systems.
- b. Identification of constraints and proposal of solutions.
- c. Testing and validating the new technology.
- d. Transferring the new technology.

Feedback mechanisms are built-in to allow modifications as conditions change. The relationship among the various stages are illustrated in Figure 1.

Multi-disciplinary team

One of the major features and advantages of the systems approach is the establishment of multi-disciplinary teams. The teams should represent the major areas of the systems such as economics, sociology, biological and agricultural sciences. The advantage of this arrangement is a more accurate description and analysis of the systems. The scientists are brought into direct contact with the participants and thereby given a better understanding and feel of the systems.

The problems and proposed solutions and alternatives are discussed among the team members. The opinions of farmers, marketers, extensionists and other technical personnel are also used in the design of alternatives. These alternatives are then tested to evaluate their actual performance. It must also be noted that various types of technologies would target different groups of end-users. These target groups, known as the recommendation domain, must be clearly identified. The initial diagnosis is done by sondeo and survey methods. Regular monitoring is undertaken to provide information about the changing environment. Research methodologies used will be consistent with the requirements of the particular discipline. Some considerations for the validation and transfer process are given in Appendix 1.

Research Station

It is necessary to have facilities where controlled experiments can be conducted. Some type of experiments can be conducted on farms. Others will require a Research Station. At the Research Station new technologies that remove constraints and solve problems will also be developed. These technologies will be available to feed into the systems.

Training

If the technology is to be sustainable, training will have to be done at various levels. Farmers and technicians must know how to manage the new technology. In using the technology the farmer will modify it and sometimes improve on it. These changes must be captured and passed on to others.

Training in the use of the methodology is vital. Technicians in all the institutions involved in this process must be exposed to the methodology. They will have an appreciation of where they fit into the process. A clear understanding of how the outputs of the various activities will be used will also enhance the performance of the system and accelerate the process.

Linkages

As the technology moves into the validation and transfer stages, other considerations have to be taken into account to achieve sustainability. Collaboration and cooperation of various institutions and agencies with specific responsibilities is necessary including: Extension Service, credit institutions, suppliers of inputs, marketing agencies, processors and training institutions.

3. AGRICULTURAL SYSTEMS IN GUYANA

The agricultural sector can be roughly divided into sugar and non-sugar crop production. This distinction is based on the organization and systems used for production. Sugar is produced by a small number of producers with a large contribution by a single producer (GUYSUCO). The other commodities are produced by a large number of smaller producers. These producers generally have mixed-enterprise systems. Rice production is changing towards an increasing number of large producers, but the majority could still be categorised as mixed enterprises.

The systems approach is applicable to both groups. Its strengths would be more evident with the small producers where the systems are more complex. The approach would also allow individual commodities to be targeted once it is realized that these would be sub-systems in a larger system. In regions where it is planned to have new investors (the Intermediate Savannahs) this approach is ideal. It will reduce the time needed for new farmers to learn how to manage in the new environment.

4. INSTITUTIONAL LINKAGES

The systems approach can identify weaknesses of institutions operating in the system. Once identified, these weaknesses will lead to actions to strengthen the institutions to help the process become more sustainable. At one time in Guyana, the Ministry of Agriculture was directly responsible for the generation and transfer of technology. This

changed with the establishment of a number of national institutions (NARI, NDDP, GMC) and the presence of both regional (CARDI) and international (IICA) agencies. It is therefore important that the process be carefully managed if these resources are to be efficiently used.

In 1991 a national workshop on linkages between agricultural technical training, research and extension was conducted. In that workshop many of the problems of the country were reviewed. Among the recommendations were the strengthening of the national institutions and the adoption of a systems approach to generating and transferring technology, (Appendix 2).

The institutions and agencies involved directly with the Generation and Transfer of Technology in Guyana are: NARI, IAST, the Ministry of Agriculture, U.G., CARDI and IICA. To avoid unnecessary duplication and optimize the use of resources, good planning and close coordination is required. Linkage with regional and international networks can provide complimentary services. From among those agencies involved directly with generating technology, one should be selected as coordinator. For the transfer of technology a network of training institutions should be established. This network of research and training institutions should be linked with common goals which benefit the targeted group of farmers. One of the major functions of the networks would be the development of good information systems.

5. POLICY

Policy influences the environment in which the systems operate. This should be clear and consistent so that everyone responds to the same message. Financing research and development is always problematic. Research is an on-going process and must be given adequate resources on a long term basis.

The sugar industry provides its own resources for research and development. The tobacco industry is similarly organized. The other commodities have been generally financed through the state. This situation will probably continue until the production patterns of the other commodities change. To ensure long term financing, the amount of resources to be invested in this process must be quantified and programmes developed. The anticipated benefits must be estimated to determine if the investment is justifiable. Sources and mechanisms for funding must be identified and developed so that the process becomes sustainable.

Appendix 1

Steps in the Validation and Transfer of Technology

A. Validation of Technology

Validation of the proposed production systems: For farmers to adopt and use new technological innovations in their production systems, they have to be convinced that these are economically viable under their own conditions. Thus, it is important that the innovations to be transferred go through a process of validation at the farm level.

The problem: To validate technological innovations the following steps are required:

1. Selection of farmers and farm. In any homogenous area there may occur more than one target group. Therefore, the identification of the target groups is the first step before any attempt to test the innovations. The identification of the target groups should be done in terms of the following criteria: farmer education and resources, farm size and utilization, access, and other factors affecting input and output management. The available information on the behavior of the models tested must be completed to provide adequate knowledge on the projected impact of the different innovations on the target groups.

Other activities include consultations with farmers on the technologies to be validated. The initial reaction of the farmers to the technology is important. The methods should allow the opinions of the farmers to be documented so they feel involved the beginning. The results of the consultation would estimate the acceptability of the innovations under the conditions of a particular target groups.

Each technological innovation to be validated has its own requirements, thus implementation requires that the responsibilities of the different participants be clearly defined. This is necessary so that each person knows his/her role and the type and frequency of each's activities on the project and farms.

Depending on the technologies to be validated, the number of farmers to be involved must be defined. Validation of simple technologies are less time consuming and may be easier to follow, thus allowing more farmers to be included. In any case, a minimum number of ten farmers would be included in each consultation.

2. Participation of farmers, researchers and extensionists. The validation process requires the active participation of farmers and people from different institutions. The key person of course is the farmer whose opinion will or will not determine that a given technological innovation is a valid one for the condition of his farm.

The objectives of the process should be clearly defined and understood by all persons involved. In this way, everybody will know what is expected to be achieved after a given amount of time. The internal communication mechanisms will also be defined as related to the means and frequency.

3. **Measurement of variables.** The validation process includes the measurement of different types of variables. These will have to be clearly defined. Biological parameters on the technology will be defined in terms of the mechanism and frequency of the measurements as they relate to the indexes that allow estimations of productivity. The economic evaluation will be conducted using the records of the outputs and inputs used, to be able to estimate return of the operation. The social variables will be evaluated in terms of the acceptance of the innovation by individual farmers and their willingness to keep on using them at their farms.

4. **Use of validated technologies in transfer of technology.** The validation phase is part of a process to consolidate the new technologies. The adoption of the innovation by a large number of farmers will help solve national or regional problems. It is an interface between the end of the research activity and the start of the transfer of technology.

B. Transfer of Technology

The problem: In the technology transfer phase, several activities must be conducted. Among them the training of the extension agents is the starting point. This training is of the practical type where the agents are taught on the mastering of the technologies from both the theoretical and managerial points of view.

For the transfer of technology to be effective, it should follow a defined process where the type, time and means are specified in advance. In such a way, the impact can be measured after the appropriate timetable has been determined.

The transfer process includes a series of activities that allows available and validated innovations to be put to use on specific farms within a target group. Since this involves the active participation of various institutions, good coordination is required to assure the success of the enterprise. The innovations must provide a sustainable output in both economic and environment terms.

1. Definition of the role of the participating institutions.

To ensure their effective participation, letters or memoranda of understanding must be subscribed. There must be a clear definition in terms of the staff, time and institutional resources. The staff of the different institutions having responsibilities for agricultural extension will be assigned and their own responsibilities clearly specified. Since the establishment and management of some technological innovations depend on the

availability of credit, the Development Bank must set aside such a line of credit and define the requirements that applicants must have to qualify at each region of the country. The operational structure for the activities will be defined in terms of the planning, monitoring and evaluation calendar.

2. Identification of the target groups for models or technological innovations. Using secondary information gathered from the previous activities, the different target groups will be identified and the innovations to be transferred defined. A detailed "ex ante" analysis will be conducted to confirm and insure the reliability of the innovations. Some interviews with farmers must be conducted to ascertain the validity of the proposed innovations.

3. Definition of the clientele of the different target groups in a given agro-ecological area to adjust the technological innovations or models. To conduct this activity the requirements of the individual farms must be identified and the developmental plan prepared. The follow-up mechanism for the farms to be part of the program will be defined. The supervised credit will be obtained and put to work to achieve the expected results within a defined timetable.

4. Definition of the monitoring and evaluation mechanism to be used in the process of transfer of technology. For the adequate "ex post" evaluation, the technical assistance methodology must be clearly defined before the start of activities. A plan for technical assistance will be carefully followed, with the collection of data from the farms under supervision. This data must also be stored in a data bank for proper utilization in the "ex post" analysis. The last part of the project will consist of the evaluation of the results obtained at the different farms involved in the process.

C. Assessment of the methodology for Transfer of Technology

Agricultural transfer of technology has been conducted using variations of different methodologies depending on the conditions. An attempt will be made to estimate the effectiveness of different methodologies used by other countries and programs which contribute to agricultural development. A task force will be established to document the impact and effectiveness of the methodology and the following activities will be conducted.

1. Measurement of the adoption of technology. An adoption survey will be conducted that will lead to the identification of the positive and negative aspects of the model or the innovations being transferred. An analysis of the results will be conducted.

2. Identification and classification of the methods used for transfer. A characterization of the methods used and the contribution of each of the methods utilized under the different conditions of Guyana.

3. Proposals for modifications to the model used for transferring technology. In order to do this, minimal requirements of the model will be identified. A timetable will be proposed for the adoption of the different types of technologies and definitions of the characteristics of the teams that have to be involved in the process of technology transfer.

Appendix 2

Weaknesses of past and current system and Recommendations for Improving the Extension System¹

- fragmentation into many separate agencies working in an uncoordinated fashion
- improper utilization of scarce resources
- inadequate responsiveness of the Regional Administration to the needs of the System
- absence of an overall agricultural development policy
- inadequate representation of farmers in the form which seek to address their problems

¹

From a National Workshop on Linkages between Agricultural Technical Training, Research and Extension in Guyana, NARI, Mon Repos, December 9-13, 1991.

Recommendations for Improving the System

A. *Structure*

- A decentralized, fully coordinated structure of the Agricultural Research-Training-Extension System was proposed.
- Regional Administrators should be sensitized and trained to appreciate the needs of the System through consultation, joint Programme Planning, and all means necessary to achieve good working relationships.
- An Agricultural Council should be formed with functions for formulating Agricultural Policy articulating regional agricultural plans, monitoring and evaluating programme implementation.
- A Co-ordinating Unit and Secretariat should be located with the Ministry of Agriculture through which information, funds, personnel, etc., should be channelled.

B. *Philosophical Approach*

- The holistic systems approach should be adopted and full, meaningful farmer participation should be ensured in the Programme Development process, in the formulation of the agricultural policy and also in the very important tasks of identification and solution of problems in Agricultural Development.
- Farmer training should be aimed at making farmers vocal and articulate and organised to address identification and definition of their problems and proposals for their solutions.
- The evolution of the System must take place against a background of free market relationships. The influences of the free market place should affect the design of all relationships; however, a purposeful attitude should be adopted to steer development in the desired national direction.

C. *Co-ordination*

- The first function of co-ordination is to provide an overall agricultural plan. It was proposed that an Agricultural Council be formed to achieve the following:
 - formulate an agricultural policy
 - co-ordinate the work of the System in the Regions
 - monitor and evaluate the implementation of the Agricultural Policy

D. *Monitoring, Evaluation and Modification*

- At all stages, the work of the System should be monitored, evaluated and necessary modifications made to ensure the achievement of outputs. The goals and outputs must be clearly defined by measurable parameters.
- As far as possible, each activity should be "projectized" where scheduled and measurable outputs are clearly defined and areas of responsibility and the requisite authority unambiguously indicated.
- The actors in this process of monitoring, evaluation and modification should also be drawn from competent professional bodies.

E. *Linkages*

- The two broad groups of linkages were recognized as internal and external to the System.
- The Research-Extension-Farmer cohesion will be ensured by the proper adoption of a Holistic Systems Approach; this approach not only ensures full farmer participation but relies heavily on a multidisciplinary approach.

- Linkages are to be **established** with other "agents of change" (health, education, etc.) in order to **fully utilize** scarce resources.
- Linkages should be **maintained** with other National Organizations which impinge on overall agricultural development, i.e. credit, marketing, other services, etc.
- Linkages should be **established** with all the other relevant national, regional and international institutions.

F. Training

- One element that **must be emphasised** at all stages of the process and at all levels of the System is **training**. This important activity must be developed after the relevant needs have **been identified**.
- Training is necessary in the use and application of the System Methodology; the formal agricultural education should emphasize aspects of agro-business (as opposed to the pure agricultural scientists).
- Induction training is seen as essential for new recruits. The body of this training will comprise the System Methodology, social-environmental awareness, and overall methods of Technology Transfer.