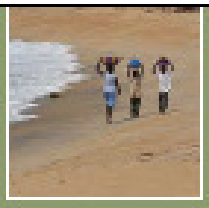
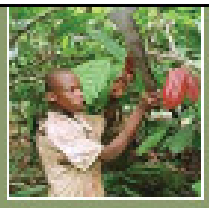
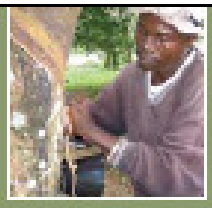





Republic of Liberia
Ministry of Agriculture
Comprehensive Assessment of the Agriculture Sector
Volume 2.1 - Sub-Sector Reports

IFAD

MINISTRY OF AGRICULTURE

COMPREHENSIVE ASSESSMENT OF THE AGRICULTURE SECTOR IN LIBERIA (CAAS-Lib)

Volume 2.1 - Sub-Sector Reports

Liberia 2007

TABLES OF CONTENTS

I. FOOD CROP PRODUCTION, POST-HARVEST HANDLING, PROCESSING, MARKETING AND CONSUMPTION WITH A FOCUS ON SMALL HOLDERS AND TRADITIONAL FARMING AND FOOD SECURITY

By

Paul Schoen
Consultant, FAO

Liberia 2007

ACRONYMS

AGOA	African Growth and Opportunity Act
ASR	Agricultural Sector Review (World Bank term for CAAS-LIB)
CAAS-LIB	Comprehensive Assessment of the Agricultural Sector-Liberia
CARI	Central Agricultural Research Institute
CBO	Community Based Organisation
CDA	Cooperation Development Authority (of the GoL)
CFSAM	Comprehensive Food Security Assessment Mission
CFSNS	Comprehensive Food Security and Nutrition Survey
DFID	Department for International Development
DRC	Domestic Resource Cost
ECHO	European Commission Humanitarian Office
EU	European Union
GAA	German Agro Action
GDP	Gross Domestic Product
GoL	Government of Liberia
Ha	Hectare
IDPs	Internally Displaced Persons
IITA	International Institute of Tropical Agriculture
IFC	International Finance Corporation (of the World Bank)
IMF	International Monetary Fund
LD or L$	Liberian Dollar
LEAP	Liberian Employment Action Programme
LEEP	Liberian Emergency Employment Programme
LWS	Lutheran World Service
JICA	Japanese International Cooperation Agency
MFI	Micro-Finance Institution
MoA	Ministry of Agriculture
MPP	Micro-Projects Programme
NIC	National Investment Commission
NGO	Non-Governmental Organisation
NPFL	National Patriotic Front of Liberia
NSAs	Non-State Actors
NTGL	National Transition Government of Liberia
MFI	Micro-Finance Institution
MT	Metric Tonne
PAM	Policy Analysis Matrix (World Bank tool for showing comparative advantage and competitive advantage status of a sub-sector or industry)
SARA	Southeastern Agricultural Relief Agency
SWOT	Strengths Weaknesses Opportunities and Threats
TOR	Terms of Reference
UNMIL	United Nations Mission in Liberia
USAID	United States Agency for International Development
US$	United States Dollar
WARDA	Africa Rice Centre

WB	World Bank
WFP	World Food Programme
WVI	World Vision International (NGO)

I. FOOD CROP PRODUCTION, POST-HARVEST HANDLING, PROCESSING, MARKETING AND CONSUMPTION, WITH A FOCUS ON SMALL-HOLDERS AND TRADITIONAL FARMING AND FOOD SECURITY

1. INTRODUCTION

This document forms a contribution chapter to the Comprehensive Assessment of the Agricultural Sector (CAAS-LIB) in Liberia and is designed to assist in indicating and specifying the potential role of specified agricultural commodity value chains in achieving the priority objectives of the government by focusing on small holders, traditional farming and food security and forms an input for the preparation of a strategic orientation framework to achieve sustainable food security, nutrition and agricultural development. It presents a number of short, medium and long-term investments proposals for the sector and discusses targeted policy options that could be considered.

The basis for this chapter was a mission[1] undertaken in September 2006 by the international consultant to gather and analyse information regarding the food crop sub-sector of Liberia through existing documentation (Annex 1), interviews, field observation and a survey involving work of a national consultant and enumerators. Meetings were held with a wide range of interested parties including Government and Non-State Actors (NSAs) (see Annex 2 for a list of people met).

Hard data in the form of documentation or survey results are limited both inside and outside of Liberia[2]. A number of NGOs have however, conducted rapid appraisal and assessment surveys of the agricultural sub-sectors but these are few and far between. Even national statistics are approximates providing little concrete evidence of income, production, productivity and imports and exports. FAO statistics whilst available online and generated through crop assessment studies began only recently, although remain as broad estimates.

Following the initial mission, which involved work in Monrovia as well as visiting two counties, Bong and Nimba, a survey was organised and commissioned in six identified counties to gather information on selected food crops as well as input suppliers and marketing agents. The enumerators interviewed just under 300[3] farmers, traders and input supply sellers of. The core findings of this survey are presented in Annex 3 and two examples of the questionnaires used are presented in Annex 4. A number of case studies have also been developed and are included in this Chapter as Annex 5.

[1] Mission conducted in September 2006 by Paul Schoen, Agricultural Economist – Food Crops. Field Survey managed by Franklin Henries.

[2] Commonly articulated in the literature reviewed and from interviews in Monrovia, is the issue of sourcing reliable data and up to date information. See also Prof. F. K. Fianu, February 2006 "Liberia: Short-Medium Term Action Plan for Crop-Livestock Rehabilitation". He states that, "There is a huge void for basic data for planning in Liberia. No detailed weather data, soil map, data on soil types and their properties, on vegetation and details of floristics, etc. could be found. This vacuum makes planning difficult and will hold back agricultural development if it remains unaddressed. Some demographic data have been assembled and mapped by the UN Agencies, however, and are available at the Offices of Humanitarian Information Centre (HIC), UNDP, Monrovia" page 27.

[3] Although 300 interviews were conducted only 152 interview sets were uncorrupted. This 152 formed the core for the database.

Following the data collected during the field visit a number of farm budgets were developed covering rice, cassava and vegetable production. These were analyzed and some crude domestic resource cost ratios were generated indicating comparative advantage of each sector and the use of scarce domestic resources. Six models are provided in Annex 6.

2. REVIEW OF PAST EXPERIENCE IN THE SUB-SECTOR[4]

Liberia continues to be in transition from a 14-year national civil war to peace, consolidation and economic recovery. A new Government, elected into office at the start of 2006, has been trying to establish a series of measures through which it will address urgent problems and priorities of the country and lay the foundations for sustainable consolidated peace and security leading to recovery and development. The agriculture sector is central to this strategy and is looked upon as meeting access to nutritious food, employment, and income and of course foreign exchange reserves. With a population of just over three million people, the vast majority are involved in agricultural production for subsistence purposes, producing little surplus either for the home market or for export. Commercial cash crops on the other hand, such as rubber and oil palm, attract different players and are operated at a different level. The agricultural sector is estimated to employ over 70% of the entire labour force although its contribution to GDP is only around 20%[5].

In 1980, GDP per capita in Liberia exceeded US$1,200 (in 2005 prices) or about US$ 3.2 per day. After 25 years of political instability, poor governance and economic underperformance, culminating in the 15 years of intermittent conflict to 2003, it had fallen to $163[6] (or about US$ 0.50 per day) making it one of the poorest countries in the region. Poverty is estimated at 76%[7] with 80% of the poor located in rural areas and over half the population living in extreme poverty[8]. Many households are food insecure, with it being estimated that 49% of the population are malnourished and 40% of children are stunted. Over 1.7 million people (half the total population) are identified as vulnerable and eligible for humanitarian assistance and food aid.[9]

The Government of Liberia (GoL) identified the following overarching objectives for agricultural recovery and natural resource development including:

- Sustainable resettlement of all vulnerable groups (Internally Displaced Persons (IDPs), returnees and conflict affected host communities); creation of employment for youth.
- Enhancing food security and achieving self-reliance in the main staple crops particularly increased and stable supply and availability of food products.

[4] Drawn from "Liberia Agriculture Sector Review in a Post Conflict Country, World Bank, Concept Note, pag 1.
[5] GoL, Ministry of Economics and Planning, Liberia Medium Term Reconstruction and Development Plan, 2001-2006, page 55.
[6] The beginnings of the civil war in Liberia are typically traced to the cross-border incursions of National Patriotic Front of Liberia (NPFL) from neighbouring Cote d'Ivoire, of which Charles Taylor became leader on December 24th 1989. However, some observers point to the army coup of 1980, which overthrew the one-party regime of the True Whig Party. Others argue that it is merely the latest episode of the struggle, begun in the Nineteenth Century, between the settlers from America and the indigenous communities of the interior.
[7] This is the proportion of the population living on less than one US$ per day. IMF, (2006).
[8] NTGL (2004:7)
[9] FAO Food Security Statistics, March 2006. The extent of vulnerability is difficult to discern because of conflicting assessments reported for the same township.

Improvement of access to food for the most vulnerable social groups and enhancement of the nutritional absorption capacity of the population.

- Increasing income of small holders through improved production, marketing and value addition with emphasis on gender issues in agriculture.
- Rejuvenating the commercial and plantation sector.
- Restocking of livestock and rehabilitation of the fisheries sector.
- Institutional and policy reforms directed at addressing the main pillars of governance including decentralisation, economic management, and food security.
- Increasing investment, both private and public, to jump-start the sectors' contribution to overall economic development.

In order to assess the performance and potential of the agricultural sector, and subsequently develop an effective strategy for agricultural development that contributes to achieving national priority objectives, particularly food security, employment and investment, the value chain of important agricultural commodities have been examined. What is shown confirms that the food crop sector is weak, primary based and almost exclusively oriented towards subsistence production, which explains the low contribution to GDP. The vast majority of Liberians depend on food imports, which substitute for local production. It is also held back by a combination of factors including poor infrastructure and input use, limited support services either privately available or from government and limited access to credit at attractive rates[10].

Given the fact that Liberia had been in a severe state of conflict for long over a decade until only recently, agricultural production not surprisingly continues to operate at very low levels of productivity as well as output. GoL has not been able to provide farmers, input suppliers or marketing agents with advisory services, inputs or marketing support. Government offices and facilities set up in Monrovia have had poor out reach facilities. Although an "enabling" policy environment is absent which acts as a break to development it is nevertheless a market oriented policy, even if more passive than actually active[11].

3. ANALYSIS OF THE CURRENT SITUATION

This section presents a general overview of the agricultural sector, provides a number of simply maps of land use patterns and discusses some of the key characteristics of Liberian agriculture.

3.1 Liberian Agriculture

General situation**.** Liberia's economy was traditionally based on agriculture. Subsistence agriculture was and remains predominate amongst 60% of the population. Of the remaining 40%, who are employed in the "formal" sector, 43% of these people have strong connections

[10] See Chet Aeschliman's Chapter on "Rural Finance and Agricultural Marketing Sub-Sectors" prepared for the CAAS-LIB initiative. November 2006.

[11] There was some agricultural research conducted in centres such as CARI in the central counties, but these were suspended until only recently when some very small-scale work has commenced (CARI has a number of commercial crop production fields for cassava and rice but this remains very much embryonic in nature).There is some research starting up again but this appears to be limited to exploration of cassava for industrial use in the main. Agricultural development has not been a vehicle for poverty alleviation although it has the potential to do so.

to the agricultural sector, typically in the plantation industry[12]. Agriculture has always been the backbone of the Liberian economy with subsistence production, rubber and timber accounting for significant shares of GDP, export earnings and employment. Subsistence agriculture, which has focused on rain-fed food crop production, has however, been characterised by its low productivity. Commercial tree crop production for export has been undertaken by large-scale plantation also includes smallholder and outgrower production systems. Table 1 shows the broad division of the economy over the 1972 to 2005 period.

Table 1: Structure of GDP

	1972-74	1979-81	2003-05
Agriculture	10%	11%	50%
Rubber	6%	5%	18%
Forestry and other	3%	9%	32%
Mining/Manufacturing	36%	n/a	10%
Other Formal	45%	n/a	40%
Traditional Economy/Subsistence agriculture	15%	20%	n/a

Source: 1972 – 74 data from World Bank (1978). 1979 – 81 values estimated based on data from World Bank (1984). 2003 – 2005 data from IMF (2006).

General character of Liberian agriculture. Four production systems have been identified that characterise Liberian agriculture. These are:

- ***Foreign commercial plantations*** producing perennial export crops (rubber, palm oil).
- ***State owned plantations*** run by the Liberian Palm Products Corporation and the Liberian Cocoa and Coffee Corporation.
- ***Domestically owned, medium-sized commercial farms*** producing industrial crops for export and livestock for the local market (although these are extremely small in number).
- ***Small traditional household farms*** using primitive production techniques with extremely limited use of modern inputs, which make up the majority of all farming and therefore the livelihoods of the rural population.

Maps

A number of maps shown overleaf and produced by FAO further help illustrate the general farming areas. These maps illustrate land cover, land use and the farming systems that are practiced. They demonstrate a heavy concentration of agriculture (tree crops and vegetable in the main) in the central belt region and root crops in the northern quadrant[13].

There are a few areas where commercial production has been explored such as in cassava and rice production (upland) but this is still in its infancy when compared to other parts of West Africa including Ghana for example or Cote d'Ivoire. The Liberian agricultural sector is broadly characterised by many farmers producing close to subsistence levels with little surplus for sale in the market place or for further processing and then sale (See also Annex 3 of this chapter for some summary findings from the survey conducted, which illustrates some core characteristics of farming practices in Liberia, lack of processing that takes place before commodities reach the consumer and the level of subsistence based activities that are evident for rice, root crop and vegetable producers).

[12] "Liberia Agriculture Sector Review - In A Post Conflict Country – Concept Note", September 2006, World Bank, pages 1-2.

[13] The consultant identified no other detailed agricultural production maps and felt that these should be presented despite their clear limitations.

In terms of real GDP growth for Liberia, Table 2 shows that this has dramatically declined between 2000 and 2005 although suggestions are that it will pick up in the next few years. The contribution of agriculture however is shown to have been small, and even in decline. Forestry is equally a poor contributor to GDP although it had been a substantial player in 2000. Mining clearly had made a large contribution although this too has fluctuated grossly in this five-year period.

Table 2: Real GDP growth estimates between 2000-2005 (% change)[a]

Item	2000	2001	2002	2003	2004	2005
Real GDP	25.7	2.9	3.7	-31.3	2.6	5.3
Agriculture and Fisheries	6.2	6.4	-4.3	-38.2	11.5	2.7
Forestry	70.6	5.0	22.4	-36.8	-34.4	4.9
Mining and Panning	49.8	-74.9	-12.8	56.7	49.5	-14.9
Manufacturing	127.5	-22.0	-17.4	-11.8	97.7	7.9
Services	15.0	3.2	7.0	-8.3	4.5	9.5

Source: International Monetary Fund, Liberia: Statistical Appendix, April 2006. [a] IMF estimates

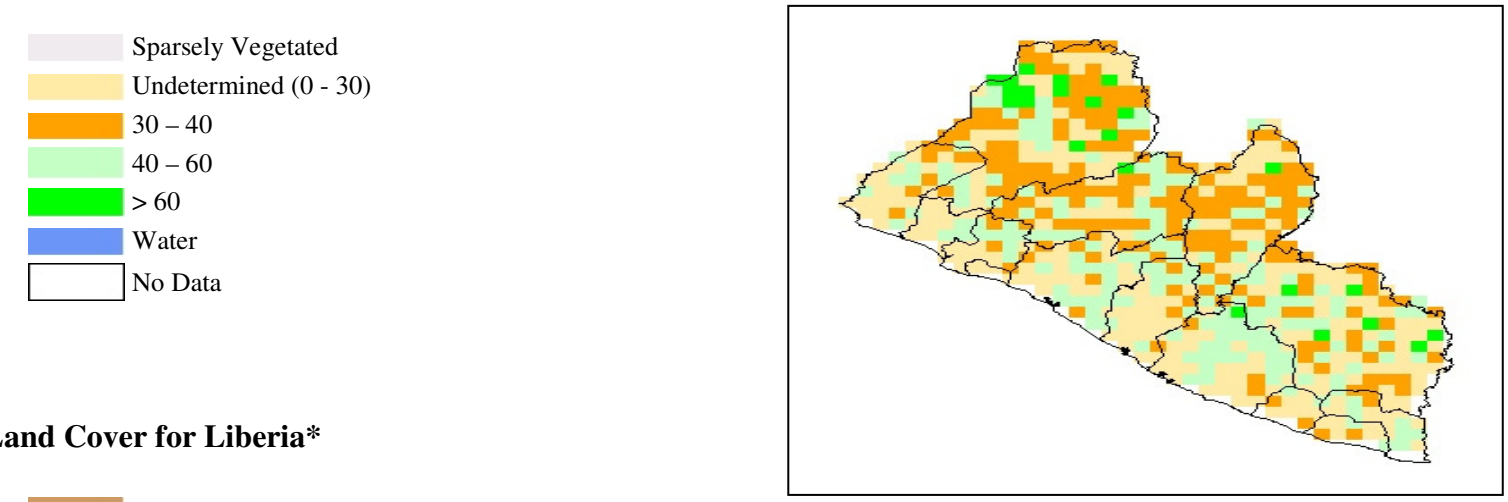
According to the multilateral and GoL's "Comprehensive Food Security and Nutrition Survey" (CFSNS) conducted between February and June 2006 a summary of the situation suggests that the:

> *"…majority of Liberians rely heavily on agriculture production, both on a subsistence and commercial basis. Thus, the agriculture sector consists of both small farmers and [a few] larger commercial producers. Small farmers tend to rely more heavily on food crop production, while commercial farmers rely on cash crops such as palm nuts and rubber trees. The largest and most well known commercial farms include Firestone, Guthrie and Cavalla. While these are large-scale commercial farmers, some commercial farmers tend to be smaller. For instance, cocoa and coffee are produced on a very small scale. Liberians in the rural areas tend to work on plantations or farms. Before the war, the northern and central areas of Liberia were effective food crop producers. Theses areas (including Lofa, Bong and Nimba Counties) were able to produce enough excess food to supply other parts of the country. However, since the end of the civil war, many farms have not returned to pre-war productivity levels[14]. Furthermore according to the survey the average size of landholding for the survey was [only] 3.3 acres (ca.1.3 hectares)[15].*

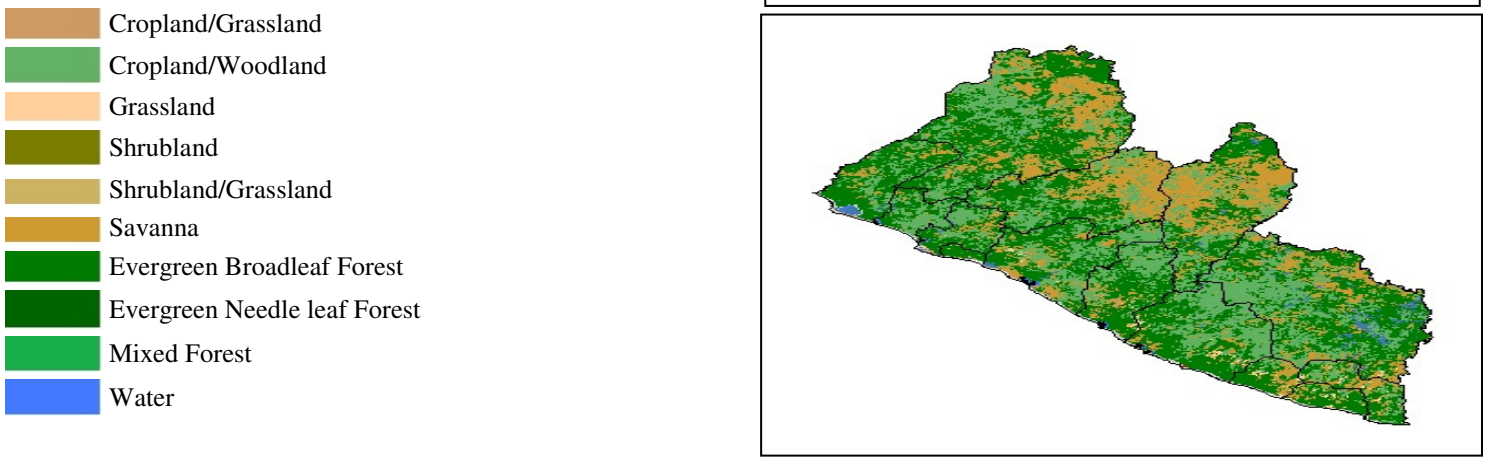
Although many rural people have access to land it appears that the size of holding has changed somewhat from before the war until now. Whilst land tenure has not been a critical problem in the past it is becoming more important in the context of access to land at the moment[16]. Limited access to land will undoubtedly contribute to community tension and be a course of conflict in the years to come.

[14] WFP and FAO CFSAM 2006, page 22.
[15] WFP and FAO CFSAM 2006, page 40.
[16] In general, land tenure arrangements are based on tribal tradition. These traditional arrangements are well adapted to the bush fallow cropping system. WFP & FAO CFSAM 2006, page 40.

Map 1: Permanent Crops and Arable Land (Percentage Intensity) for Liberia*



Map 2: Land Cover for Liberia*

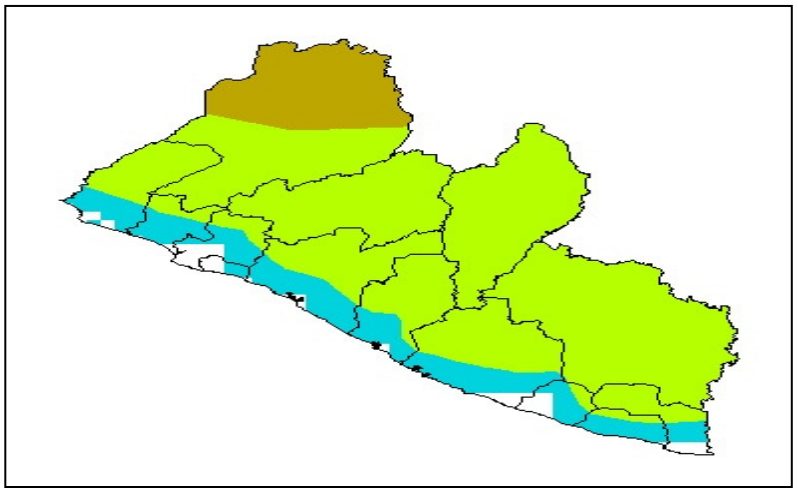


*Source: FAO – Country Profiles and Mapping Information Services (website: http://www.fao.org/countryprofiles/maps.asp?iso3=LBR&lang=en), 2006

Map 3: Broad Farming Systems for Liberia*

Farming Systems

- Tree crop including vegetable production and some upland rice
- Root crop (principally cassava and some upland rice)
- Coastal artisanal fishing and some swamp rice



Source: FAO – Country Profiles and Mapping Information Services (website: http://www.fao.org/countryprofiles/maps.asp?iso3=LBR&lang=en), 2006

Core crops. Table 3 shows the level of Liberia's dependency, low production levels and fluctuating import and export levels experienced in the agricultural sector particularly for the major items of natural rubber and paddy rice. Cassava productivity, on the other hand, appears to have grown substantially from a low of 300,000 MT in the 1979 to 1981 period to a high of 490,000 MT in 2003. The value of agricultural exports has however gone down from a high of US$135 million to a low of US$34 million. Agricultural imports on the other hand have also declined but more slowly.

Table 3: Basic Statistics of Agricultural Trade, Production and Fertilizer Use

Land Use	**UNIT**	**1979-81**	**1989-91**	**2000**	**2001**	**2002**	**2003**
Total Land	1000 HA	9,632	9,632	9,632	9,632	9,632	--
Arable Land + Permanents Crops	1000 HA	576	612	595	600	600	
Arable Land	1000 HA	371	397	380	380	380	-
Irrigated Land	1000 HA	2	3	3	3	3	-
Agricultural Production Major Items							
Natural rubber	1000 MT	81	55	105	107	109	110
Cassava	1000 MT	300	33	441	480	480	490
Rice, paddy	1000 MT	254	191	183	145	110	100
Foreign Trade – Exports							
Total	MLN US$	555.4	376.7	500.0	500.0	500.0	500.0
Agricultural	MLN US$	135.6	61.6	65.5	69.3	77.5	34.0
Major Exports (share in Agriculture)							
Rubber, natural (dry)	percent	68.0	86.4	91.5	94.5	98.1	85.2
Cocoa beans	percent	8.7	4.9	5.2	1.2	1.3	11.6
Coffee, green	percent	19.5	5.0	0.3	0.4	0.2	1.0
Foreign Trade - Imports							
Total	MLN US$	505.9	267.3	400.0	400.0	400.0	400.0
Agricultural	MLN US$	97.3	83.0	87.6	66.0	71.8	77.4
Major Imports (share in Agriculture)							
Rice, milled	percent	34.9	53.8	17.4	24.7	27.9	25.8
Breakfast cereals	percent	0.3	0.0	3.4	2.0	4.0	8.7
Maize	percent	0.5	0.0	6.9	9.1	9.1	8.4
Agriculture trade balance							
Exports-Imports	MLN US$	38.3 -	21.4	22.0	3.4	5.7	- 43.4
Lands & Inputs							
Total Population/ Arable Land	Inhab/HA	5	5	8	8	9	-
Fertilizer Use/Arable Land	kg nutrs./HA	12	3	-	-	-	-
Tractors/Arable Land	No/1000 HA	0.8	0.8	0.9	0.9	0.9	-

Source: Various sections taken from FAOSTAT: World Bank - World Development Indicators, 2005

[20] It is unclear from the statistics whether these refer to industrial cassava production or simply home grown subsistence. If the latter this would be understandable at a time of civil war given its food insecurity and the ability to leave cassava in the ground until needed. Such increases may not continue in the future- correspondence with AGSF, FAO January 2007.

3.2 Status of food crops

Tables 4 and 5 illustrate the rapid decline in area harvested for rice paddy and cassava production over the war period from 1990 to 2004. Rice area farmed has averaged around 114,000 hectares with an average yield of 1 tonne/ha over this period. National production swung in this period erratically from 180,000 tonnes in 1990 to a low of 50,000 tonnes in 1994 averaging over the longer period to 2004 to around 125,000 tonnes. Cereal imports have correspondingly filled the short fall.

Table 4: Core Statistics for Rice – Paddy Production and Imports

Year	Area harvested (1000 Ha)	Average National Yield per hectare in Tonnes	National Production (1000 tonnes)	Rice Imports – Qty Mt	Imports – Value $'000 US$
1990	175.00	1.03	180.00	70,328	25,145
1991	110.00	0.91	100.00	171,945	64,200
1992	120.00	0.92	110.00	141,392	51,715
1993	60.00	1.08	65.00	178,473	48,650
1994	45.00	1.11	50.00	120,895	44,130
1995	50.00	1.12	56.20	155,169	35,100
1996	75.60	1.25	94.450	195,443	46,900
1997	135.20	1.25	168.40	147,657	24,800
1998	161.90	1.29	209.40	170,571	25,700
1999	153.70	1.28	196.30	136,091	20,800
2000	143.50	1.28	183.40	221,420*	37,000
2001	130.00	1.12	145.00	100,000	20,000
2002	120.00	0.92	110.00	100,000	20,000
2003	120.00	0.83	100.00	100,000	20,000
2004	120.01	0.92	110.00	100,000	22,000
Average	**114.66**	**1.08**	**125.21**	**125,864**	**33,742**

Source: FAOSTAT *Note: Combined milled paddy rice, wheat, flour maize and maize. FAO Estimate.

In terms of cassava and vegetable production (non-disaggregated by type) FAO estimates show that a steady increase in the area devoted to cassava[20] took place whilst the area set aside for vegetable production has been rather static. Production in both cases has also hardly changed in the 14-year period over which these statistics are available.

Rice and Cassava[21]. Rice is the staple food of Liberia with an estimated annual consumption of 300,000 tons yet Liberia only produces about one third of this. This means there is local market potential. Although the world market price is currently depressed it sells at a fairly high price in Liberia, so making rice production for the local market profitable.

Swamp rice is more profitable than upland rice production, as long as it is reasonably well managed. Poor management though, results in yields of 15 bags per acre, and a lower gross margin than upland rice. Although upland rice is low yielding there are benefits from the inter-crops grown with it.

Cassava is second in importance to rice as a staple food, and important for food security with returns to cassava production quite good. A critical factor, when it comes to marketing, is the distance of the plot from the farmstead and the road, as cassava is a bulky low value and

[21] Based on material in David Parker's report on "Farm Management Survey of Liberian Smallholder Tree and Food Crops", June 2001, page 6-7.

perishable crop. Developing the markets for various products that can be made on the farm from cassava could improve its prospects as a cash crop.

Table 5: Core Statistics for Cassava and Vegetable Production

	***Cassava* (fresh and dried)**			***Vegetables***		
Year	**Area Harvested (1000 Ha)**	**Quantity produced (1000 tonnes)**	**Yield per has (tonnes/has)**	**Area Harvested (1000 Ha)**	**Quantity produced (1000 t)**	**Yield per hectare (tonnes/Ha)**
1990	55.00	380.00	6.91	17.00	70.00	4.12
1991	42.00	270.00	6.43	17.00	70.00	4.12
1992	40.00	280.00	6.67	17.00	70.00	4.12
1993	40.00	245.00	6.13	17.00	70.00	4.12
1994	29.00	250.00	6.25	17.00	75.00	4.41
1995	32.81	175.00	6.03	17.00	75.00	4.41
1996	43.30	213.26	6.50	17.00	75.00	4.41
1997	47.00	282.20	6.52	17.00	75.00	4.41
1998	55.50	307.00	6.53	17.00	75.00	4.41
1999	67.00	361.30	6.51	17.00	75.00	4.41
2000	72.50	440.50	6.57	17.00	75.00	4.41
2001	72.50	480.00	6.62	17.00	75.00	4.41
2002	75.00	480.00	6.62	17.00	75.00	4.41
2003	75.00	490.00	6.53	17.00	75.00	4.41
2004	75.00	490.00	6.53	17.00	75.00	4.41
Average	**54.77**	**342.95**	**6.49**	**17.00**	**73.66**	**4.33**

Source: FAOSTAT, 2006

Markets[23]. The Liberian market is very small although it does have the advantage of being concentrated in Monrovia, yet its effective demand is weak due to the poverty level of most Liberians.

There is a need to look to develop products that require a minimum of capital but also allow produce to be processed on the farm, extending their shelf life and enhancing their value. Examples would include dried fruit, pureed fruit and fruit leathers. These products would first be developed for the local market and as quality improves and a critical mass obtained, eventually for export.

Production systems. The FAO/WFP Crop and Food Security Assessment For Liberia conducted in February 2006 indicated the very weak production systems in the country. It stated that:

"Although rice and cassava is largely consumed by most Liberians, it is not grown on a large scale by any individual or entity. Subsistence farmers who use rudimentary tools and traditional methods of cultivation mostly carry out production of these crops. Moreover, there are no current available statistics describing the performance of these two crops. The only available statistics are those produced by the Bureau of Statistics of the Ministry of Agriculture in November 2001. According to this baseline survey, average rice farm size per farmer is 1.18 ha compared to 0.48 ha for cassava. The report also shows that estimated average rice and cassava yields are 1.3MT/ha for rice and 7.8MT/ha for cassava[24].

[23] Ibid.
[24] This is close to the general FAO statistics found in Table 1 and 2 of this chapter.

Relative to the baseline[25] estimates yields of cassava and rice [the FAO/WFP assessment] mission observed a gloomy picture of the current situation. Yields of rice and cassava are extremely low. The mission estimated that less than 30% of the baseline figure is produced in 2005 season for rice and 76% for cassava"[26].

According to another FAO report also in 2006, "Most food crops in the country (probably about 90 %) are produced by means of an age-old subsistence system whereby the land is cropped by slash-and-burn with bush fallowing. Rudimentary implements like hoes, machetes and axes are used and the farmer and his or her household can only till about half to one hectare"[27].

The three or four targeted areas identified for the purposes of this report (cereals principally rice, root crops (including cassava and yam) and vegetables) are at early stages of development with none showing huge potential in the short term for change and none having really reached a level of potential sophistication attractive for external commercial investment based on the evidence identified[28].

Value Chains and Value Adding. Figures 1 to 3 in the adjacent pages present a schematic overview of some of the value added processing within the food crop sub-sectors for vegetables, rice and cassava based on fieldwork conducted and interviews with farmers and market traders. Very little value adding in the chain appears to take place with the chains being limited, very short and often confined to only two or, at best, three rings along the chain. There is little value being added[29] in most cases whilst at best a simple trading relationship seems to take place. Some conversion of cassava into fufu or gari takes place (to permit marketing over distances or time without deterioration) but the value increase is marginal – purchases appear more for convenience than anything else.

There is very little difference between small-scale farming and subsistence-based farming with little surplus in both cases available for sale. Figures 1 to 3 show that differences between trading, production and selling are small and prices between the farm gate and the point of sale to the end consumer in most cases is also low[30]. Given that most rice produced is for subsistence purposes it is not surprising that very little domestic production finds itself on the open market. Of the amount of produce that gets onto the market a substantial amount of this is lost through wastage.

This does not mean that these commodities cannot become more important commercially but the investment in training, in infrastructure, in setting up factories which convert the products into a higher value commodity, in food quality assurance and food handling, storage and transport and packaging would need to be made. With much of the farming remaining at

[25] Sub-reference to the Baseline Survey of the Ministry of Agriculture carried out in 2001.
[26] FAO/WFP Crop And Food Security Assessment For Liberia February 2006, Section 8, page 18.
[27] "Liberia: Short-Medium Term Action Plan For Crop-Livestock Rehabilitation", Prof. F. K. Fianu, February 2006, page 36.
[28] There is a conspicuous absence of medium to large-scale agro-processing plants in the country. (See FAO-RAF Multidisciplinary Mission to Liberia. March 2005. Page 28).
[29] The survey results for this chapter show that 80% of all farmers interviewed do not undertake processing of any sort. The remaining 20% of farmers interviewed indicated they might conduct some gari preparation, grinding of pepper and okra, milling and par-boiling. There is also little value being added at the smallholder level in the tree crop sector of rubber and the dwindling production of coffee and cocoa production systems as observed by David Parker in 2001 (See David Parker's report of 2001) Pages 17, 22 and 23.
[30] This is also confirmed by the food crops survey undertaken in October-November 2006 for this chapter.

subsistence level, increasing production and productivity will be difficult. Limited amounts of excess produce were seen in the vegetable and cassava production sub-sectors but where this takes place wastage and spoilage could be as high as 50%[31] which impacts negatively on availability and incentive to over produce.

Value chains are extremely short with very little value actually being added to the product. It might be safer to view these as marketing chains rather than value adding chains for now.

Identifying areas in the food crops sub-sector showing comparative advantage or the potential for economic return, without heavy investment in the supporting physical as well as economic environment, were few if any at this stage.

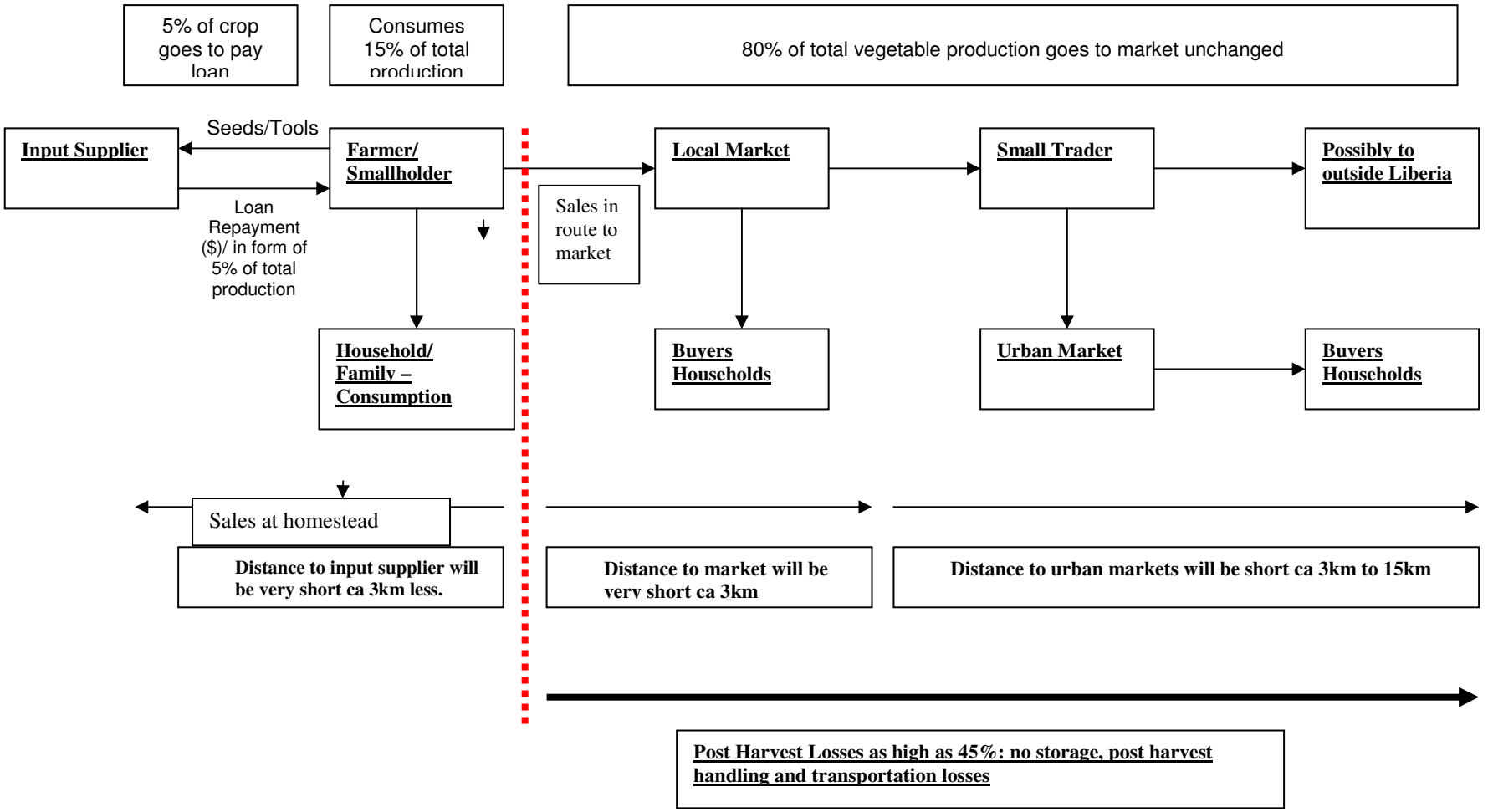
Household consumption pattern. Household farms are based on family labour with an estimated average size of 1.5 ha[32] according to the 2001 Bureau of Statistics Baseline Survey. Output is largely consumed by household members and consists of food crops (rice, roots, tubers, legumes), small livestock (chickens, goats) and small plots of cash crops (coffee, cocoa).

The predominant character of the traditional small farm is one of low productivity of land and labour. Shifting cultivation on the uplands is still the main technique and the family constitutes a large part of labour on farms with little hired hand permanently or even on a causal basis[33].

Agricultural Input Suppliers. Input suppliers are those who supply items to farmers such as seeds and tools. Many will also be smallholders themselves. In practice though, the scale of these operations are extremely small and limited in scope, range of product and services provided. Some do provide credit to farmers although the majority do not[34]. They deal directly with both farmers and other buyers and employ one or two staff to help run their business. Located in small villages and towns their shops are often small and under-stocked. Important also to note is the low or even zero use of fertilizer over a 20-year period as shown previously in Table 3.

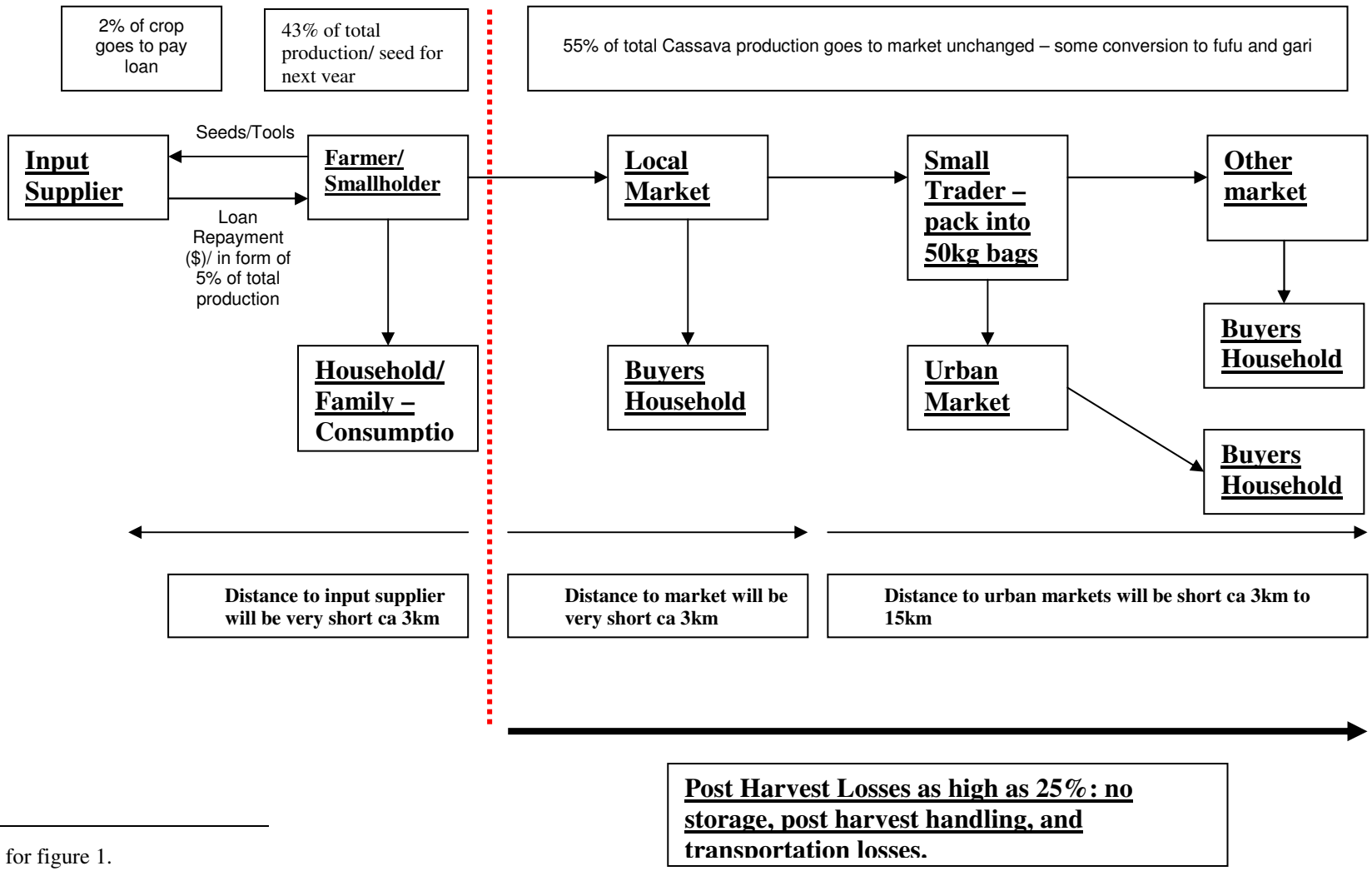
[31] Based on mission interviews with farmers and traders.
[32] The food crops survey conducted for this review showed that the over 90% of those farmers interviewed farmed land that was 2 hectares or less.
[33] Again drawing on the food crop survey 92% of all farmers interviewed indicated that labour came from within the family.
[34] The survey conducted for this review showed that two thirds of all input suppliers interviewed (admittedly the group was small to be begin with at only 9 interviews), no advisory services were provided. Thirty per cent however did extend some form of credit to the buyer.

Figure 1: Vegetable Value Chain[35]



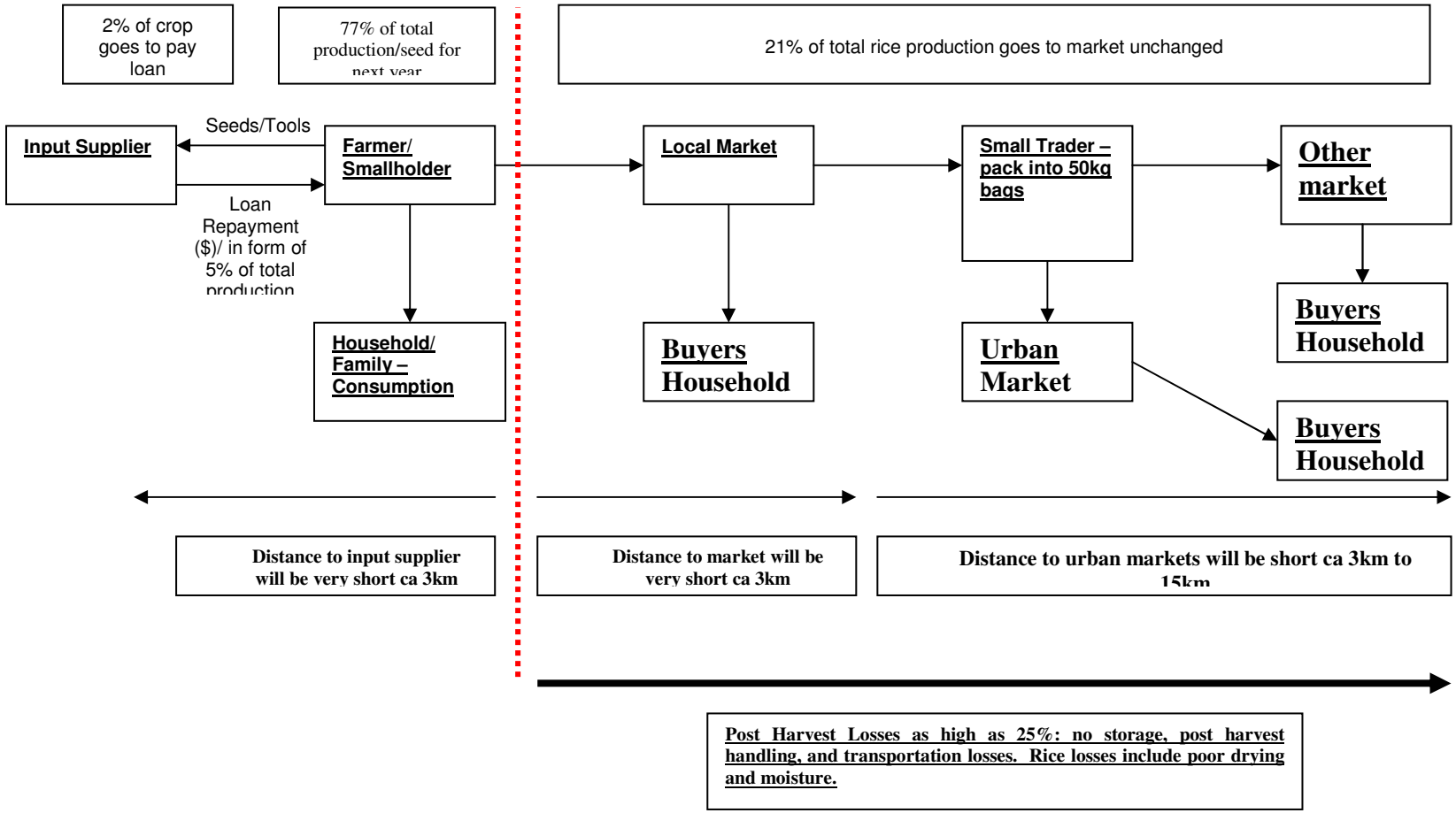
[35] Compiled from data in: October 2006 Survey for this chapter and from Compendium of Food Security and Nutrition Survey, Liberia, June 2006, and from James Tefft, "Agricultural Policy and Food Security in Liberia", ESA Working Paper, March 2005, FAO.

Figure 2: Cassava Value Chain[36]



[36] As for figure 1.

Figure 3: Rice Value Chain[37] (mainly upland)



[37] As for figure 1.

Markets. Most county capitals and some secondary urban centres have daily markets. The exceptions are Barclayville in Grand Kru and Fishtown in River Gee that hold markets weekly. Markets in the southeast generally offer a rather limited, homogeneous and costly set of food and non-food commodities, with the exception of those closely located to the border with Cote d'Ivoire.

Women are mainly responsible for marketing. Difficult access to markets, particularly in the rainy season, has a negative influence on production and income, as well as on the availability of foodstuffs. For commercial crops such as rubber, cacao and coffee the existing poor transportation network also affects them. Producers have to pay for transport to buyers' substations or sell to middlemen at lower prices at the farm gate. Poor infrastructure dampens production, limits the marketing network, and constrains people's access to goods and cash or credit[38].

There is less trade between the south-eastern counties and Monrovia than between the central region and the capital. This is because there is no direct, main road along the coast from Harper to Monrovia. Heavy trucks and buses have to travel from the south-east to Monrovia via Zwedru taking two days in total and adding to the cost[39].

People living in communities close to Guinea, Sierra Leone, and Cote d'Ivoire cross the borders to trade in food and dry goods. The traders bring goods such as rice, soft drinks, beer, salt, soap, kerosene, laundry soap, onions, cloth etc, and some farm implements. This trade is profitable because the price of the above items is much higher in Liberia based on the fact there is limited manufacturing locally.[40]

Crop Losses and Wastage. On the whole whilst rice, either upland or swamp, is grown almost exclusively for home consumption it is often supplemented by purchased long grain variety, itself imported from China or the USA, about 50% the vegetable crop production leaves the homestead for the market. Many farmers mill their own rice using pestle and mortar resulting in many broken grains and a poor milling out-turn of some 50%[41]. However, in the case of vegetables almost 50% of these go to waste due to poor handling, damage in transport, rot or other loss. This was also recorded in the recently completed FAO/WFP Food Security Assessment Survey in February 2006 and verified by field observation[42].

---

[38]Prof. F. K. Fianu, states that, "Foodstuff marketing in Liberia, as elsewhere in the sub-region, is fraught with high wastage and high risk of food contamination. Women are the ones who trade in foodstuffs but the marketplace environment is not friendly to nursing women and those with frisky toddlers. Places of convenience are often not provided and the market sheds and stalls are not enough to go round so when it rains much foodstuff damage occurs beneath the sheets used to cover the wares. Sellers are frequently forced to stand in quagmire to sell". February 2006 Liberia: Short-Medium Term Action Plan For Crop-Livestock Rehabilitation.

[39] For example, from Barclayville in Grand Kru, the cost of transport to Monrovia in the dry season is LD2,500 and more than LD 4,000 (between US$ 40 to US$ 66) during the peak (rainy) season.

[40] For example, one kg of rice costs LD30 in a community close to Cote d'Ivoire compared to LD 20 for a very small cup (approximately 250 grams) in Barclayville market (Grand Kru). Source: FAO food and Security Assessment for Liberia February 2006.

[41] See David Parker EU study of 2001. Page 36.

[42] According to the Food Assessment survey conducted in early 2006, "Across all counties [surveyed] the rice harvest for 2005 was mainly household produced and consumed. Only 7% was sold nationally, however reaching peaks of 17% in Nimba, 14% in Grand Cape Mount and 11% in Montserrado. Overall the second main use was preservation as rice seeds with 13%. Cassava is also mainly consumed (57%), however was overall more marketed than rice (35%). 70% or more of cassava was consumed in River Cess, Grand Kru, Grand Bassa and Sinoe. It was mainly sold in Grand Cape Mount, Monserrado and River Gee (50% or more). The selling or consumption of vegetables varies greatly between counties while overall it is more common to sell vegetables than to consume them". Page 42.

Cereal Dependency and Food Aid. Liberia's cereal import requirement, mostly rice in 2006 was estimated at 204,000 MT. Of this, 90,000 MT was estimated to be imported commercially, 74,000 MT was nationally produced and the balance (some 40,000 MT) made up from food aid by donors but managed by the World Food Programme (WFP).

Table 6 shows the weakness of Liberian food crop production over the period 2000-2002, and significant dependence on imported food, which continues to be the case.

Table 6: Food Balance for Liberia (2000-2002 in '000 tonnes)

Food Crops	Production (+ve)	Exports (-)	Imports (+)	Seed, Feed, other (-)	Consumption (-)
Cereals	97	1	212	52	256
Vegetable Oils	47	4	9	4	48
Sugar	4	-	12	0	16
Roots and Tubers	529	-	2	6	525
Meat	21	-	5	0	26
Milk	1	-	6	0	7

Source: FAO Country Profiles 2002, Liberia.

3.3 Vulnerabilities

There are a number of vulnerabilities, which are faced by small farmers. These are briefly listed in the section below:

Markets. Market access is not always easy or close by and distances needed to travel can be enormous especially if the only means is by foot. Many county markets are open, exposed to the elements and *ad hoc* in management. Access to water, electricity and even functional stalls are also limited.

Infrastructure. Related to marketing but also the purchase of inputs and supplies is the absence of infrastructure which can facilitate movement of goods in and out of production areas. There is also limited storage for commodities and poor food handling appears to contribute to large food wastage and loss[43]. In some cases, such as vegetables, this can be as high as 50%.

Knowledge Sharing and Research. The absence of any technical support for farmers from extension agents or private sector non-cash crop buyers is also limited. Knowledge sharing is informal, local and indigenous which may contribute to improved production levels but is, again, limited in nature. In addition, knowledge of input use is poor at the local level and sources of information to supplement this are weak.

Enabling Policy. The position of GoL in terms of providing and supporting an enabling agricultural environment is benevolent but passive in practice. Although there are no policies that subsidize farm inputs or encourage improved performance in the food crop sector, there are none equally that act against it.

Credit. The availability of credit and access to finance remains problematic. The accompanying chapter on finance and marketing reports that, "the infancy of rural

[43] Supported by statements made by Prof. F. K. Fianu, February 2006 "Liberia: Short-Medium Term Action Plan For Crop-Livestock Rehabilitation" although he did not attempt quantification. Page 37.

microfinance in Liberia, the rarity of bank branches outside Monrovia and the conservative approach of commercial banks mean that for the foreseeable future, *at least for the next 5 to 10 years, rural financial services will not be available to the vast majority of creditworthy farmers, at least through currently-available channels*. Even when the MFIs [Micro-Finance Institutions] finally arrive in a majority of villages, most will be reluctant to invest large sums of money in agriculture because of the perceived high risk of doing so"[44].

Natural environment. Farming in Liberia is also under threat from the problems of flooding, water control, pests and other natural elements although this is not countrywide. Irrigation and water management potential exists but this would require huge investment in infrastructure and training in operation and maintenance.

3.4 Food Crop Sector Assessment Survey

A survey was undertaken between September and November 2006 to identify value chains that were perceived to be important. Just over 150 significant interviews were conducted over a six-week period with farmers, traders and farm input suppliers. The data derived from this was sufficient to profile the production system and also lead to the identification of a number of areas of intervention that could be attractive for future investment. Five questionnaires were developed and used in the process of data collection (three food crop specific and two dealing with input supply and trading). These are described below:

- ***Commodity Survey:*** The core agricultural sub-sector surveys included rice, root crops and vegetables (e.g. bitter ball and pepper). Additional information generated included data on farm production, financial returns of farming, what farmers were selling and what they were producing for home consumption.
- ***Input Supplier Survey:*** A small number of input suppliers were interviewed to determine what is sold and their prices and what inputs are available on the market as well as ease of access marketers have to farmers selling produce.
- ***Trader Survey:*** Traders were also interviewed to determine if there was any value adding taking place between the farm gate and end consumer. It was also intended to elicit costs of transportation, processing and marketing.

A number of Gross Margin Analysis were planned to be undertaken on selected focal food crops such as rice, cassava, cowpea, maize and vegetables (e.g. cabbage and chilli peppers) based on existing enterprises in agricultural group projects such as Nimbabian Bangladeshi Friendship Agricultural Project (NIBAFAP) and the Dokodan Farmers Cooperative in Nimba County but it was agreed that this would be conducted by the consultancy on agricultural extension.

3.5 Findings of the Survey and SWOT of Areas visited

Based on the survey results the following SWOT Analysis in Table 7 provides a summary of all areas visited. Flooding interestingly appears to restrict production in the counties of Grand Kru and Maryland only whilst poor road infrastructure and limited transport is a major weakness in nearly all areas with the Southeast the worst hit generally and Grand Kru the hardest hit in particular. The findings reinforce the issue of vulnerability, isolation and

[44] Draft Report for CAAS-LIB - "Liberia's Rural Finance and Marketing Sub-Sectors", FAO- Ghana. Chet Aeschliman et al, November 2006.

remoteness of producers accessing markets. The incentive to produce for a local market is, significantly reduced with farmers preferring to concentrate on subsistence practice rather than food crops for sale.

Table 7: Summary SWOT of Areas Visited

Strengths	Weaknesses	Opportunities	Threats
Food Security	Lack of technical support	Abundant arable land	Pest infestation
Family Labour	Drudgery in post harvest work	Good Market potential	Some Flooding
Self sustainability	Health hazards	Relative peace	
Source of income	Lack of trapping materials	High market demand	
Good sales profit	Lack of farm inputs	Self employment	
Good health	Lack of road infrastructure		
	Lack of transport		

3.6 Field Data Analysis of Core Commodities

The following section draws on the data results of the survey and is made with reference to the three tables shown overleaf. Farm sizes across the three-food crop sub-sectors were recorded as low with an average in each case of 1.5 ha for rice, 0.8 ha for cassava and 0.7 ha for vegetables.

Table 8 shows low agricultural rice production yields in Bong and Grand Kru Counties. On average 64% of rice harvest is consumed at home whilst 36% is sold. In Grand Kru, food is mainly exchanged for other foodstuff under a system of barter due to limited cash, high poverty and lack of commercial trade opportunities. Some farmers paid for inputs either in-kind or in-cash. For comparative reasons the in-kind payment has been converted into cash and the value expressed in the Table 8. Limited fertilizer use was seen in lowland areas, mainly in and around Cape Mount and Nimba Counties.

Table 9 indicates data for root crop producers cultivated on average as little as 1 ha and consumed about 42% of the harvest. The major cassava consumption areas include Grand Kru, Maryland and Nimba Counties. Cassava consumption is consumed mainly in raw form, but is on occasion eaten boiled or in pounded form. In both Bong and Grand Cape Mount Counties, the highest income from the sale of cassava was recorded. 59% of root crop farmers hired labour to assist in the cultivation, which suggests that labour costs are lower than elsewhere.

Table 10 confirms that vegetable producers are the most profitable in the farming sector. In Bong and Nimba Counties, vegetable production is carried out commercially and represents the largest number of producers and the highest return from sales. Profit from vegetable production was nearly three times that of rice production. Fertilizer use is also highest in this group. Subsequent analysis of the database confirms the profitability of vegetable production.

Table 8: Production Data for Rice[45]

	Average Farm Size *in Hectares per county*	**% of farmers from sample who used home grown seed**	**Rice seed cost per kg (US$)**	**% of farmers from sample who bought fertilizer**	**% of farmers who rented land and average price at which they rented land per county**	**%of farmers who employed labour and average rate paid per county for a piece of work**	**Average Output Kg/ha per county**	***% of produce consumed at home***	***% of produce sold***	**Sale Price US$/Kg**	**% of farmers who reached Profit level per farm (US$)**
Bong	1.4	50%	0.2	None	28% paid $16	50% paid $37.45	588	79%	21%	0.2	39% @$166
Grand Cape Mount	1.5	5%	0.3	11%	None	76% paid $33	1,122	55%	45%	0.26	33% @$129
Grand Kru	1.9	100%	0	None	None	Family labour	2,46	48%	52%	0.6	Barter Sales
Maryland	1.5	100%	0	None	None	Family labour	1,042	78%	22%	0.36	95% @ $82
Nimba	1.4	39%	0.32	6%	17% paid $21	6% paid $45.64	1,033	59%	41%	0.28	77% @$136
Average	**1.5**	**59%**	**0.27**	**8%**	**23% paid $18.50**	**44% paid $39.00**	**806**	**64%**	**36%**	**0.34**	**61% @ $103**

[45] Tables 8, 9 and 10 have been complied on data collected during the field survey conducted in October 2006.

Table 9: Production Data for Root Crops

County	Average Farm Size *in Hectares per county*	% of farmers from sample who used home grown seed	Cuttings Purchased per bundle	% of farmers from sample who bought fertilizer	% of farmers who rented land and average price at which they rented land per county	% of farmers who employed labour and average rate paid per county for a piece of work	Average Output Kg/ha per county	*% of produce consumed at home*	*% of produce sold*	Sale Price US$/Kg	% of farmers who reached Profit level per farm (US$)
Bong	0.6	77%	$0.55	None	None	94% paid $11	7,369	31%	69%	0.08kg	$263
Grand Cape Mount	1.4	None	$1.00	None	22% paid $6.00	94% paid $95.00	6,365	32%	74%	0.15kg	$203
Grand Kru	0.8		$2.13	None	None	12% paid $16.00	1,836	56%	44%	0.15kg	$26
Maryland	0.5		$2.34	None	None	29% paid $19.00	3,857	47%	53%	0.17kg	$48
Nimba	0.6	38%	$3.19	None	38% paid $29.00	67% paid $29.00	7,188	45%	55%	0.06/kg	$76
Average	**0.8**	**58%**	**$1.84**	**None**	**30% paid $18.00**	**59% paid $34.00**	**5,323**	**42%**	**59%**	**0.12/kg**	**$123**

Table 10: Production Data for Vegetables

County	Average Farm Size *in Hectares per county*	% of farmers from sample who used home grown seed	Cuttings Purchased per bundle	% of farmers from sample who bought fertilizer	% of farmers who rented land and average price at which they rented land per county	% of farmers who employed labour and average rate paid per county for a piece of work	Average Output Kg/ha per county	*% of produce consumed at home*	*% of produce sold*	Sale Price US$/Kg	Average Profit per farm per county (US$)
Bong	0.8	33%	$7.00	61% paid $37.05	16% paid $22.00	77% paid $27.00	2,704	12%	88%	0.96	$678
Grand Cape Mount	0.8	11%	$9.11	67% paid $13.46	5% paid $26.00	95% paid $23.00	1,418	20%	80%	0.72	$162
Grand Kru	0.4	13%	$2.93	None	None	25% paid $6.00	344	47%	53%	0.67	$17
Maryland	0.3	None	$3.36	None	5% paid $3.45	14% paid $17.00	1,200	41%	59%	0.78	$28
Nimba	1	None	$7.00	56% paid $34.80	28% paid $46.00	100% paid $26.00	2,145	17%	83%	0.84	$602
Average	**0.7**	**19%**	**$5.88**	**61% @ $28.43**	**14% paid $24.00**	**62% paid $20.00**	**1,562**	**27%**	**73%**	**0.79**	**$297**

3.7 DRC Calculations and SWOT Analysis

Initial Domestic Resource Calculations (DRCs[46]) of domestic production are presented in Table 11 covering the three food crop sub-sectors these being rice, cassava and vegetables. Six models have been developed. This Table also includes a set of data on the size of farm examined showing that they are all very small in scale and practice mixed subsistence and commercial farming as a norm.

Table 11: DRC Comparisons for Rice, Root Crop and Vegetable Production

Production System	Size of smallholding and percentage used for commercial production	Private Profit (in US$)	Social Profit (Shadow Prices – US$)	DRC (ratio)	Comparative Advantage
Model 1: Upland Rice (Bong)	1.4 has (of which 21% produce is sold)	7.27	-16.63	1.43	Some
Model 2: Lowland Rice (Nimba)	1.6 has (of which 89% produce is sold)	17.29	340.89	0.30	High[47]
Model 3: Root Crop – Cassava (Nimba)	0.6 has (of which 55% produce is sold)	99.90	168.36	0.16	Very High
Model 4: Vegetable Production (Grand Cape Mount)	0.8 has (of which 80% produce is sold)	465.48	1,160.40	0.04	Very High
Model 5: Bitterball-Plantain-Other Vegetable (Maryland)	0.8 has (of which 40% produce is sold)	25.79	43.93	0.19	Very High
Model 6: Bitterball-Plantain (Maryland)	0.4 has (of which 50% produce is sold)	3.43	10.07	0.47	High

[46] **Definition of DRC**: "The Domestic Resource Cost ratio, or DRC, measures the ratio of domestic factors used to produce one unit of rice (e.g. labour and capital invested in the production) to the added value generated by this unit of rice (i.e. the value of the production minus all the investment costs, e.g. seed, fertilizer, energy). The DRC is estimated using social prices—that is, prices that would prevail in the absence of government intervention on input and output markets (e.g. subsidies on fertilizer sales price, duty on rice imports) or market failure (monopoly). If the ratio is greater than one, more domestic resources are invested in producing the commodity than the added value generated by the production activity—there is no comparative advantage in producing the commodity and the domestic resources would be more efficiently utilized if allocated to another productive activity. Conversely, if the ratio is below one, the commodity is produced using less domestic resources than the added value generated—rice producers do have a comparative advantage. Source of definition: WARDA's "Annual Report 2001-2".

[47] The results of the DRC analysis and comparison between lowland and upland (or swamp) rice are important. Lowland rice production shows higher potential with good management than upland rice production offering higher yields and returns to labour, capital investment and general efficiency. David Parker evens goes as far saying that, "The development of the swamp is the key to producing a marketable surplus". (See David Parker, EU Study 2001, page 37-38 and 42).

Table 11 also shows calculations that indicate upland rice production has little comparative advantage as it stands at present and has a suggested DRC ratio of about 1.43. Its use of domestic resources is too high and better use could be made of finances to grow other commodities for the market. However, since private profit is just positive, producers have an incentive to produce domestic rice for home consumption. Lowland rice production also shows a good DRC ratio at 0.30, which suggests that further research into its comparative advantage, needs to be undertaken. Lowland rice production is very much more labour intensive and could provide employment for men and women whilst at the same time responding to the staple food insecurity needs of the country.

Vegetable growing is by far the most profitable, with cassava the root crop representation being relatively profitable. As is perhaps to be expected, Liberia has high comparative advantage in producing cassava and vegetables for its urban markets whose reliance on fresh produce is currently only met by domestic production.

The full calculations are shown in Annex 6 for each of the sub-sector crop models developed using data collected from the survey.

In contrast, Table 12, developed by WARDA in 2002, illustrates the DRCs for a number of West African and shows the changes between 1973 and 1996 that can be achieved in comparative advantage. In all cases DRC for rice improved between 1978 and 1996 where they were calculated showing that production systems can change if there is a concerted effort and policy support to realise this shift.

Table 12: West African DRC Comparisons for Rice

Country	1978	1993	1995	1996
Cote D'Ivoire	1.68	1.02	0.73	Nc
Mali	0.69	Nc	Nc	0.40
Senegal	1.66	Nc	Nc	1.12
Sierra Leone	0.89	Nc	0.55	Nc

Sources: CERDI Université d'Auvergne; Stanford University; WARDA. Annual Report, 2001-2002. Calculations produced by a Stanford University Study of selected West African countries.

An analysis of the strengths and weaknesses of the value chains of the selected commodities and assessment of the comparative advantage is presented in Table 12 generated during the initial mission. This Table also covers fruit production, a fourth sub-sector, which theoretically should have high market value although this mission has not investigated its potential. Original thoughts on the state of play of the food sector have been confirmed by the survey results.

Table 13 presents a SWOT of the sectors reviewed and shows that there are a number of opportunities to commercialise sub-sector activities although investment will be needed in terms of education, agricultural research and pilot testing on farms to narrow down support in the identified sub-sectors. High wastage and loss of produce through poor handling, rot or storage are areas of concern. As all sub-sectors suffer equally from this, some are likely to suffer more from their perishable characteristics than others.

Table 13: Strengths, Weaknesses and Comparative Advantage of Selected Crops

Value Chain for:	***Strengths***	***Weaknesses***	***Demonstration of Comparative Advantage to meet* domestic household food security, nutrition, incomes as well as for regional and international exports**
Cereals (especially rice – upland)	There are two types – upland and lowland. Most farmers cultivate upland. There is a strong farming awareness of rice and some potential for growth in this area. Demand is high as rice is a staple crop of Liberia.	Processing is by hand, production mainly for home consumption and little opportunity for surplus as imports (from China and USA) are readily available (even if expensive). The number of harvests achieved per year is few - currently it is estimated that only one crop per year is achieved when in fact this should be at least twice that. Productivity per hectare is also too low at about 25% that achieved outside Liberia. Currently about 1 tonnes per hectare. (Based on several interviews with rice/paddy farmers and verified by the national consultant in food crops).	Production of local rice is not seen as a boost to income but rather to contribute to food security as a staple food source. Currently there is no comparative advantage seen either regionally or internationally for upland rice. The production is to satisfy subsistence needs rather than market needs, and supplemented by rice imports. No government policies are in place yet to provide an incentive to reverse this. A possible area is organic rice production in the future but this would need substantial investment in infrastructure, food handling and packaging to reach certification stage (very little fertilizer and pesticide application takes place currently). Calculations shown by this mission suggest that upland rice has a relatively low DRC suggesting that use of limited domestic resources should be channelled to other efforts.
Root crops (the main crop considered is cassava)	As with rice production, cassava growing is popular and meets some food security needs and some cash needs production. Value adding potential exists converting the commodity possibly into bio-fuel or other product such as starch. Low technology would be a possibility meeting local market demand.	Industrialisation of cassava production and post-harvest value adding is limited and would require investment in hardware, training and promotion. Production losses are high from pests and plant diseases.	The current production of root crops shows some comparative advantage and the potential exists to industrialise the sub-sector. Further research would need to be conducted into the sub-sector to explore local and industrial demand and undertake feasibility studies to examine viability. Calculations by the mission suggest good DRC ratios.
Vegetables (the main crops possibly are items such as bitter ball and peppers but it	A market exists for a number of vegetables although items such as tomatoes and cucumber for example were not seen at points of sale. Half of	Almost no value adding was observed. Some vegetable leaves were cut for the consumer at the point of sale. Generally poor handling, storage and packaging incurring large post-harvest loss.	There would seem to be scope for expansion of the vegetable sector through both reducing post harvest loss and increasing production and productivity. Improved transportation and other infrastructure, as

Value Chain for:	***Strengths***	***Weaknesses***	***Demonstration of Comparative Advantage to meet* domestic household food security, nutrition, incomes as well as for regional and international exports**
is difficult to be sure because of the limited variety in markets.	the vegetable production is for sale in markets, whilst the other half is for home consumption. The markets are more likely to be urban centres. There is the potential to focus on female-headed vegetable garden and production systems.		well as training and increased access to competitive lines of credit could provide an incentive for an increase in vegetable production, handling and marketing. The production system would need to substantially changed and some specialization would have to take place. Currently large volumes of vegetables are coming into Liberia from across the borders with Guinea and Cote d'Ivoire or, as seen in Monrovia, as frozen produce from Europe, USA or the Middle East. DRC calculations show that vegetable production has reasonable comparative advantage with a DRC ratio approaching 1. With greater effort and investment it may be possible to bring the DRC even further down.
Other Observations – the fruit sector (this was not examined in this mission but seems to present itself as a potential area for economic growth in the agrarian sector)	Liberia has the potential as with other warm climate regions to grow high value fruit crops which could if sufficient investment took place, be exported or converted into higher value products such as juices and tinned fruit.	As with many places fresh fruit availability is limited and under-developed. The investment needed to bring the sub-sector to an industrial and therefore economically interesting stage would be enormous. The Liberian palate seems to dictate against development of this sector.	The potential for setting up juicing plants and fruit conversion into dried products or into another value added item seems to be large and could offer early gains. Current data on fruits is scanty although this would be an area that could be investigated further. Even the FAOSTAT has very little information on this and a more detailed fruit study would need to be conducted.[48]

[48] A study conducted by David Parker for the EU in 2002 suggests that, "Banana and citrus look to have the highest returns per hectare and good potential returns. Both products are for the domestic market though and demand is therefore limited." Page 16.

4. THE WAY FORWARD

4.1 Supporting Structures to Establish Comparative Advantage

In order for the food crop sector to establish itself and become a supplier of food as well as generate paid employment and increase its contribution to the local and national economy a number of supporting structures need to be put in place. These will also contribute to establishing comparative advantage and will contribute to creating competitiveness. Turning a suitably agro-ecological region into a higher economic driver is not easy although when coupled with a population that has good indigenous knowledge may make the transition easier.

These initiatives should be driven by GoL in the first instance and supported by donors such as UNDP and the EU as well as bilateral agents of change where they operate in the country such as DFID, USAID and JICA for example. Technical support can be met by FAO and other technical agencies.

Production Systems. Production systems need to receive legitimate focus from both technical and managerial agents of change. Improved farming techniques and practices, such as better seeds, better land husbandry management and pest management should be the focus of MoA in particular. The measures that will contribute to achieving this include policy focus from MoA, collaboration efforts and joint activities with research and extension services.

Markets. Market places should be identified and improved including the supply of stalls, water and electricity and management systems for their operation. This could also assist in generating new employment and alternative income activities. A number of the urban areas could be selected as pilot programmes of support to markets in centres such as Monrovia, Harper and selected centres inland.

Credit. Micro-finance credit schemes need to be encouraged through the creation of products held with existing banks and the generation of appropriate attitudes towards farming as a viable business proposition. Access to credit is important for smaller farmers or cooperatives that are beginning to face the challenges of future growth[49].

Infrastructure. Necessary infrastructure such as roads and communication systems need to be considered in the long term. Immediate infrastructure could include market places[50], feeder roads and water points.

Knowledge Sharing and Research. Local, as well as international, knowledge on sectoral changes need to be made available to enable improvements to take place in terms of production, productivity, efficiency gains, marketing, food processing and handling and where possible value adding without pricing the commodities beyond the reach of most people. Agricultural research should recommence allowing an incremental increase in output

[49] See chapter on Draft Report for CAAS-LIB - "Liberia's Rural Finance and Marketing Sub-Sectors", FAO-Ghana. Chet Aeschliman et al, November 2006. Page 33.

[50] See the examples of micro-project programmes where market construction is an important element of economic generation, employment generation and where women have the opportunity to become market sellers and market masters e.g. Micro-Project Programmes of the EU, in Nigeria, Ghana and Malawi.

if it can be taken up by farmers' organizations, NGOs and other civil based organizations (CBOs) whose role would be to act as centres of information and exchange of knowledge.

Enabling Policy. From a policy point of view GoL needs to be more proactive in terms of it support to agricultural change. This includes GoL support to MoA and increased budgetary allocation for extension, and service provision to farmers. There needs to be an emphasis on production, productivity and a general move towards establishing food security, which includes access including purchase or production of food.

4.2 Government Policy

The Government of Liberia has two policy position papers these being, "Statement of Policy Intent" and "Strategy for the Agricultural Sector" but neither provides sufficient detail on what government will actually be doing or supporting in the short term let alone the medium and long term. The Ministry of Agriculture (MoA) is small, understaffed and lacking skills needed to develop and support agricultural change. It is assumed therefore that MoA's role will come in the form of legal statue and in providing the legal boundaries of commercial activity rather than undertaking agricultural research, direct extension and training. Government's role will be in developing an enabling environment for economic stability and growth[51].

Public and private partnerships might provide an initial opportunity for investment. Government will also need to consider a programme of incentives that allow small or even micro agro-industrial business to be established employing people and generating income. Forms of contract farming and off-farm work and even non-farm work should also be examined (e.g. in the transportation sector or packaging sectors).

Given a policy vacuum however, the entrepreneurial sector cannot be relied upon to substitute for Government nor *visa versa* but as a provider of services, which can be delivered in a way, which generates economic return efficiently and effectively.

The MoA has no policy on market information gathering, pricing (from input through to last point of sale) or on ways and means of monitoring agricultural sector behaviour. A continuous process of reviewing, analysing and fine tuning the understanding of the agricultural sector needs to take place and tools such as the Policy Analysis Matrix (PAM) need to be adopted internally so that the impact of public support and private sector activities can be monitored and adjustments made. Given the limited resources available such quick and relatively reliable indicators of return to investment and economic support could be adopted. They are not at present.

Overall the government's economic policy centres on the principle of the "Free Enterprise System" with the market as the principal determinant and which translates into a minimum involvement in the economy. Where the Government is involved, this is limited to joint ventures to achieve national goals and to stimulate the private sector. The Government's

[51] David Parker report in 2002 showed this even then when he stated that, "The government has a very limited revenue base and little source of borrowing. It therefore has no operational agricultural research or support services. The government appears to have a "hands-free policy" of entrusting as much agricultural development to the private sector or the NGO sector. For smallholder farms, agricultural support is being given piecemeal through a battery of NGOs with short term funding horizons, often supported by multi-lateral donors, with similar short-term funding. There does not appear to be any coherent guiding policy." Page 10.

policy places major reliance on individual and private initiatives[52]. The National Investment Commission (NIC), which spearheads the investment drive focuses on medium and large businesses, and has little interest in micro-business or small agro-industrial concerns. It therefore misses the opportunity to contribute to agricultural change. It would be important that NIC therefore reconsider its focus to include small-scale farming and activities upstream and down stream of production in its portfolio as a special area of interest requiring smaller amounts of capital investment and shorter realisation periods.

Liberia's liberal business climate is designed to attract foreign investment and support economic growth and development. Through a liberal Investment Incentive Code, Liberia offers several physical benefits, including exemption from custom duties, income tax, stamp fees and other benefits, to new and expanding business enterprises for approved investments projects including agriculture, forestry, fishing, and mining. Other potential areas for investment incentives include building, construction, transport and communication and approved investment projects may also be eligible for support in securing loans and guaranteeing credit by the Central Bank.

4.2.1 Policy on food imports

There are no statutory foreign exchange controls in Liberia, and funds generally are freely remitted in and out of the country.[53]

Liberian governments have consistently maintained a liberal policy towards food imports and exports and the current situation remains the same. Unfortunately Liberia also remains rather dependent on food aid, which has come under the directive of the World Food Programme (WFP). Whilst Government remains concerned with the importation of rice coming freely into the country and views the commodity strategically it maintains a zero monetary and fiscal policy towards it. Late in 2006 there was a concern that importers had been holding off on a large consignment of rice in order to speculate for higher prices. Government intervened charging the importer with "economic piracy" and placing him under arrest. Although this charge was subsequently dropt it demonstrates the importance the current Government places on rice as a staple food for consumers. It did not however, lead to the introduction of any law or policy to protect the country from this happening again but rather, demonstrated the vulnerability of Liberia to forces of commercial interest and possible speculation. Importantly engaging in dialogue with importers would be a good step in the right direction to develop an enabling environment and improving productivity and production for more access to food.

4.2.2 Policy on Tariffs on Imported Goods (machinery, other inputs)

Imports of machinery and other goods are subject to tariff duties, ranging between 2.5% and 25%, which constitute a major source of government income. Import duties are specific (based on weight for example) for some commodities and *ad valorem* (based on cost, insurance, and freight value) for others. Specific duties apply to foodstuffs (rice though is a special case and exempt from this), beverages, petroleum products, and certain rubber and textile products. All exports and some imports require licenses. Customs duties are 25% on luxury items such as alcoholic beverages, apparel, cosmetics, electronics and jewellery.

[52] National Investment Commission, www.libnic.com

[53] Source: http://www.lowtax.net/lowtax/html/liberia/jlacfir.html

Although the Free Port of Monrovia was closed in 1999, goods up until that time could be landed, stored, sorted, manufactured, repacked, re-forwarded, or transhipped without payment of customs duties.

4.2.3 Current Policy on Agro-Industry

GoL has no current policy on agro-industry beyond an awareness of the main cash crop sectors of rubber and oil palm. These industries do not receive particular assistance or incentive other than that they are free to conduct their business in a close to tax free environment.

4.3 On-going and Planned Activities and Interventions of Other Partners

***NGOs*.** The NGO sector is extremely active in Liberia. They range from large, international and reasonably well-funded organisations to small, local and limited funded actors and civil based type organisations. Many NGOs and others classified as Non-State Actors (NSAs), have agricultural programmes related to training and some input supply support (including the supply of starter packs covering seeds and basic tools). Mercy Corps and German Agro-Action (GAA), for example, have community based organisation programmes to support peace building, youth activities and agricultural recovery improving both the business and agricultural management skills of farmers, small businesses and entrepreneurs. MercyCorps is supported with USAID funding, whilst Agro-Action receives funding from the EC's Humanitarian Office (ECHO).

***Multilateral Agencies*.** UNDP is also involved in agrarian support. Its current effort is geared towards promoting the "Establishment of a Songhai-Liberia Initiative for the Promotion of Rural Growth within the Liberian Government Programmes LEEP and LEAP". This programme is based on the Benin model of clustering enterprises (SMEs) that can be linked together for higher efficiency and the promotion of rural growth and employment generation. The programme is targeted at all 15 Liberian counties and each having an identified agricultural commodity at its core. Funding comes from UNDP, USAID and ILO and is supported by FAO[54].

The World Bank has focused on agro-forestry and the forestry sector in general as its intervention policy and this is set to continue for a number of years to come. Prime support is given however, to infrastructure and road construction and this too is likely to continue. This is an invaluable contribution, as it will provide channels along which trade can take place.

Donors, such as DFID, are only just beginning to venture into Liberia but this is limited for the moment. Their Liberian development programme is managed from Freetown, Sierra Leone.

4.4 Policy Options, Interventions and Investment

This paper presents below a number of policy options, interventions and investment scenarios, which GoL could consider for implementation with support from the international community. These would go someway to improving food security and an improvement in

[54] This programme is due to commence in early 2007.

nutritional status, provide income and employment. These also target the food crop sub-sectors identified earlier.

It is clear that investment other than in general terms, needs to be made in infrastructure (e.g. roads, storage, processing and pack-houses), training, market research and market information gathering and form an important programme of change in the rural economy. These have been well articulated by the 2005 FAO agricultural policy and food security mission, which emphasised that:

> *"Reducing the real cost of food to the rural and urban consumer is an important objective for the Liberian government in the medium term as it works to rekindle the production potential of its agricultural sector. Achieving this objective depends on inputs in several areas, notably productivity-driven increases in production, better roads for reduced transport costs, market information, greater participation and competition in import and domestic marketing systems (traders, cooperatives), transparent and favourable import policy (food, fuel and spare parts), application and enforcement of regional trade regulations and reinforced economic governance to reduce transaction costs and enforce contracts. Each of these factors contributes to establishing a reliable, lower cost supply of food at less variable prices. Competition and proper incentives for traders, farmer organizations, cooperatives and other private actors to become involved in agricultural marketing are particularly important issues to address to reduce the cost of food. Lebanese and Mandingo importers, wholesalers and transporters have historically played important roles in Liberia's mercantilist system of trade and economic control, in agricultural marketing as well as in financing farmers' crop production. Liberia needs to find a delicate balance between establishing a level playing field and competitive environment for all participants (with safeguards against monopoly power) with a supportive policy and regulatory framework that provides incentives for the private sector to make productive investments that are critical to the long-term development of Liberia's agricultural sector"* [55].

4.5 Proposals for Institutional Reforms, Policy Options

A general strategy across commodities to develop value-addition can effectively be applied in traditional farming systems, leading to real income generation, employment and food security for small holders by concentrating on small changes at the point of post harvest and prior to onward transportation. Currently farmers/sellers make little if any changes to the produce they make available on the market. Essentially produce is sold in a raw state, often unwashed and poorly presented. The opportunity to alter this seems obvious and training and awareness rising of the potential to increase margins and the sales price is therefore high. The following policy and investment options are designed to assist in this process.

4.5.1 Policy Options

It is suggested that GoL consider identifying areas where there is high opportunity focusing on improved productivity in high potential areas (such as small, middle and large farmers although it is recognised most farmers fall under the small category) and addressing food security concerns in vulnerable areas where production will still take place for self sufficiency reasons and local markets (as identified in existing data and from the food crops survey). This would cover both food staple production and horticulture crops. Identification

[55] James Tefft, "Agricultural Policy and Food Security", FAO/ESA Working Paper 05-11, March 2005, page 10.

of areas could be based on historically important productive areas and those with favourable agro-climatic advantages.

4.5.2 Investment Options (Programmes and Projects)

The investment options outlined below are designed to narrow the gap between domestic food requirement and production over the next 10 years, improving incomes and support seed distribution, agricultural inputs, micro-finance credit systems and investments in marketing infrastructure, road networks, irrigation, research and extension.

Furthermore it is recommended that some basic services for farmers such as soil testing, pesticide and fertiliser quality control and management including certification for food quality could be considered. Investment by Government in regulatory issues and facilitating public and private partnership in provision of services to farmers at least in the medium to long term is necessary and encouraging the National Investment Commission (NIC) to include in its focus small agricultural business would be a way forward.

There is a clear need to strengthen the agricultural information systems of MoA and the statistical wing of the agriculture ministry for regular crop assessment, monitoring and record keeping.

In terms of food crop exports it is known that Liberia will have received African Growth and Opportunity Act (AGOA) status on 1st January 2007 and is in discussion with EUROGAP. However for Liberia this is not enough for a successful future. International markets for Liberia's food crops will demand quality, reliable supply and high food safety standard at prices that are competitive. The field visits undertaken indicate that the state of play of Liberia's food crop production is a long way from ensuring any of these criteria if investment is not made in the areas of basic education, good agricultural practices, market awareness for the quality of crops being sought, transport, storage and post harvest handling to name a few.

The following sections detail a number of proposal options covering the priority areas. An estimate of the cost of these is presented alongside the brief proposal although these will have to undergo significant review. The discussion is briefly presented in three sections: a) immediate term, b) short term and c) medium to long-term (5-10 years) periods.

a) Immediate Term: Investment in Studies, Sector Analysis and Monitoring

Short term or immediate investment (over the next one to two years) includes discrete sub-sector studies and setting up monitoring systems capturing such items as market data, players in the sector, input and output prices regularly. In particular it is important to consider undertaking the following sub-sector studies:

- The impact of the WFP programme in Liberia on the local economies.
- A study on transport and haulage of agricultural produce and commodities.
- A study on infrastructure including markets, communication, input supply.
- A detailed study on the impact of Government's agricultural policy with respect to imports (in particular Rice from overseas).
- A number of PAM Studies could be undertaken of various sub-sector operators in the food crops sector e.g. juicing or processing.
- The study of micro-businesses and SMEs in Liberia.
- A number of detailed sub-sector studies e.g. for rice and vegetables.

- A number of case studies need to be undertaken for illustrative purposes (some will have been undertaken in the follow-up section below) including cooperative arrangements, or following the transport of certain food crops from producer to final market and end consumer.
- A review of the seed sector should be undertaken.
- Putting in a place a monitoring system for market information (e.g. prices, quantities, production).

Immediate Term: Investment in Studies, Sector Analysis and Monitoring cost: ca. US$ 1,000,000

b) Short Term: Two-to-Five Year Investment Proposals

Education and Targeted Training[56]**.** In terms of the next investment level there is a real need for education and specific training including literacy and numerical proficiency before moving into business training and marketing, and encouraging entrepreneurial activity. These are important because they carry producers to the next level of business activity[57].

Appropriate Technology for Increased Productivity and Production. Investment could include training in improved farming techniques to increase productivity and output as well as in simple technologies to allow small processing houses or factories to be established using appropriate and affordable machinery. Limits to this however include good quality seed stocks, fertilizer (whether organic or chemical), guaranteed power supply, inputs for the processing activity and relatively reliable transport from the farm gate to the market trader and end consumer as well supply of produce.

Basic Services. As discussed above some basic services for farmers need to be considered including soil testing, pesticide and fertilizer quality control and management including certification for food quality could be considered once the supply side has been fully studied and examined.

Data Collection and Statistical Services. Agricultural information systems of MoA are very weak and support for data collection, and in particular the statistical wing of MoA for regular crop assessment, monitoring and record keeping is a priority. Although very difficult to achieve even in the intermediate term, developing a marketing information service is nevertheless very important to alert farmers to market opportunities. It might be possible as a starting point to encourage NGOs to disseminate market information with technical support from FAO's AGS office but this would need further development[58].

[56] See World Bank commissioned study: The Evolution of Agricultural Education and Training: Global Insights of Relevance for Africa, Carl Eicher, Michigan State University, August 2006 in which the author states that over the next 15 years at least US$1 billion will need to be invested in agricultural education and training alone.

[57] It is noted that FAO-AGSF has a range of training materials that could be used to develop training programmes. Information on these can be found by the consultant at: http://www.fao.org/ag/ags/subjects/en/agmarket/agmarket.html; http://www.fao.org/ag/ags/subjects/en/ruralfinance/index.html; www.ruralfinance.org; and soon to come on-line: http://www.fao.org/ag/ags/subjects/en/farmMgmt/index.html.

[58] Comments by Andrew Shepherd, FAO, AGS on an earlier version of this report suggest an interesting initiative of encouraging NGOs to act as conduits for market information in collabouration with radio stations and mobile phone service providers (see http://www.nextbillion.net/node/1694). Further comments from him suggest that the experience of FAO in Africa and elsewhere, that NGOs trying to work in agricultural marketing have an inadequate appreciation of what needs to be done and that FAO could organise a training programme for NGOs (and Ministry extension staff).

Short-Term: Two-to-Five Year Investment
Proposals cost: ca. US$ 5,000,000

c) Five-to-Ten Year Investment Proposals

Processing and Packaging. In the five to ten year time frame investment should take place to improve both processing and packaging of commodities on offer. Concentration could take place on the vegetable sector in particular leading to improvement in handling, storage and sale of the more perishable items. It is also anticipated that the fruit sector may attract attention and be a focus of investment given the potential for such value adding activities such as juicing and further processing. Small scale juicing plants and cleaning houses are envisaged which would allow local juices to substitute for expensive imports.

Infrastructure. There is a clear need in the next five to ten years for public and private investment in supporting infrastructure. Initially this could be in the form of, for example, small-scale markets with water services included. If individuals/communities can appoint market "masters" to manage the markets as an enterprise this may lead to sustainable continuation of the project. There is strong linkage with the Micro-Projects investment option described below.

In addition the World Bank and possibly African Development Bank could be approached to support road and market project construction incorporating market development and upgrading in those locations benefiting from the improved road system.

Micro-Projects Programme (MPP) and Micro-Credit System. The micro-projects programme (MPP) can be used as a means to support numerous small-scale projects where the need is highest. In some cases these can be community driven or if credit related, privately targeted. However, setting up such programmes is not easy although the target population in Liberia is rather small and therefore this option seems feasible.

The establishment of a Micro-Credit Fund to support local initiative and fill temporarily an absence of reliable banking lines of credit for small and micro-enterprises could be opened up and information shared more widely and transparently while commercial banks take on board the possibility of developing micro-credit as part of their every day portfolio of products on offer.

Five-to-Ten Year Investment Proposal cost: ca. US$ 25,000,000 (probably 50% of this will be for infrastructure and 50% for MPP type activities)

4.5.3 Indicative Costs, Returns and Risks

A summary of indicative costs is presented in Table 14 together with identified risks. Returns to investment will need to be calculated although at this stage they have been qualitatively assessed. Full feasibility cost-benefit analysis will need to be undertaken to develop and review the individual proposals.

Table 14: Summary Investment Table

Proposal	Cost (US$)	Return	Risk or Assumption
a) Immediate Term (1 to 2 years)			
Studies	1 000 000	High return in terms of information gap filling	Low risk
Sub-total:	1 000 000		
b) Short Term (2 to 5 years)			
Education and Targeted Training	2 500 000	High return in terms of information gap filling	Overall Low risk
Appropriate technology	1 000 000	High return potential	Overall Low risk
Basic Services	1 000 000	High return potential	Overall Low risk
Data Collection and Statistical Services	1 000 000	High return potential	Risk of limited skills in country to carry through the work and sustain the services
Sub-total:	5 000 000		
c) Medium to Long Term (5 to 10 years)			
Processing and Packaging	6 000 000	Good return in the long run	Risk of limited production without some form of guarantee such as contract farming
Infrastructure	10 000 000	Good return in the long run	Clearly a public investment with private sector benefits
Micro-Projects Programme (MPP) and Micro-Credit System	8 000 000	Good return in the medium run	Payback of loans, investments are made in projects supported
Sub-total:	24 000 000		
Overall total:	**30 000 000**		

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Liberian agricultural production is weak and undeveloped. The vast majority of Liberians rely on agriculture for their livelihoods or as the prime source for their food. Having emerged from a 14 year long civil war the Liberian agrarian economy is very much hindered by an absence of sustained investment either by Government or the private sector and entrepreneurial activity is at an infant stage.

5.2 Recommendations

Analysis of the current food crop sector and a review of the potential gains from investment suggest that investment is needed in a number of core areas these being education, market information and support to improving productivity of a number of core food crop sub-sectors. Whilst rice and root crops including the staple cassava crop are favoured the vegetable sector shows highest profit potential although lowland rice production has promise as well.

It is recommended that three investment phases be considered covering the immediate, short term and medium to long-term periods. Investment is estimated at around US$ 30 million in total over the next five to ten years.

- Immediate investment is required to undertake detailed research in a variety of areas, which are both private sector (e.g. market studies) and public sector oriented (e.g. Policy Analysis Matrix (PAM) review and study).

- Short Term investment is considered important to build local education in numeric management and literacy whilst also moving into farm and business planning, budgeting, and gross margin analysis. Basic field-testing kits and other rapid impact activities are also considered in the short term, as is the improvement in data collection, data management and analysis.

- Medium to long-term investment will be required in infrastructure, micro-projects programming and micro-credit support including support for micro-businesses and SMEs in the agro-sector.

  The investment options are summarised in tables 15, 16 and 17, please see next pages.

Table 15: Immediate Term Investment (1 to 2 years)

Name of Activity	***Studies, Sector Analysis and Monitoring***
Institutional Responsibility	Development agencies allocated on the basis of strength to conduct the work – MoA, FAO, possibly IFC for SME work.
Aim(s) of Activity	The aims of these activities will fill in gaps in knowledge of key areas and act as inputs to decision-making and resource allocation.
Description of Main Activities	***Suggested studies and reviews:*** • The impact of the WFP programme in Liberia on the local economies; • A study on transport and haulage of agricultural produce and commodities. • A study on infrastructure including markets, communication, input supply. • A detailed study on the impact of Government's agricultural policy with respect to imports (in particular Rice from overseas). • The study of micro-businesses and SMEs in Liberia. • A number of PAM Studies could be undertaken of various sub-sector operators in the food crops sector e.g. juicing or processing. • A number of sub-sector studies e.g. for rice and vegetables. • A number of case studies need to be undertaken for illustrative purposes (some will have been undertaken in the follow-up section below) including cooperative arrangements, or following the transport of certain food crops from producer to final market and end consumer. • A review of the seed sector should be undertaken. • Putting in a place a monitoring system for market information (e.g. prices, quantities, production and output and input usage) – could be undertaken by FAO marketing section).
Expected Result(s)	It is expected that the results of these activities will dramatically increase the knowledge base of decision-makers in Government and its development partners, guiding them as to which areas of investment are needed and identifying and fine tuning agricultural policy.
Impact on Food Security, Poverty Reduction and Economic Development	Greater information as to economic activity will assist in allocating limited physical and financial resources to where the needs are greatest.
Period of Execution	Immediate Term (1 to 2 years)
Estimated Cost	US$ 1 000 000

Table 16: Short Term Investment (2 to 5 years)

Name of Activity	**Short Term: Two-to-Five Year Investment Proposals**
Institutional Responsibility	Development agencies allocated on the basis of strength to conduct the work – MoA, FAO
Aim(s) of Activity	The aim of the two-to-five year investment proposal is to raise the level of understanding of agriculturalists, increasing production, productivity and output.
Description of Main Activities	• **Education and Targeted Training** • **Appropriate technology** • **Basic Services** • Data Collection and Statistical Services
Expected Result(s)	*Training:* It is expected that the through training and education productivity, production and quality increases will be seen in the agricultural sector and that output will reach a level that can compete successfully on the open market and food security will also become more certain. Basic services will eventually develop and to a point where farmers and other agriculturalists are able to practice land husbandry more effectively, reducing wastage and other inputs. *Local technology:* Examination and promotion of appropriate local and regional technology will increase production but using simple machinery, which can be easily constructed, implemented and maintained. *Data and Statistics:* Data collection and statistical services will be developed to a point whereby information is reliable and forms a basis for sound decision-making and policy formulation by Government but also by the private sector on which to make investment decisions.
Impact on Food Security, Poverty Reduction and Economic Development	Greater information as to economic activity will assist in allocating limited physical and financial resources to where the needs are greatest.
Period of Execution	Short Term (2 to 5 years)
Estimated Cost	US$ 5 000 000

Table 17: Intermediate Term Investment (5 to 10 years)

Name of Activity	**Medium-Term: Five-to-Ten Year Investment Proposal**
Institutional Responsibility	Development agencies allocated on the basis of strength to conduct the work – MoA to lead, FAO, World Bank, EC (based on their experience of Micro-Project Programming)
Aim(s) of Activity	The aim of the five-to-ten year investment proposal is to dramatically improve the handling, processing and value adding of commodities grown in Liberia. This will increase the worth of the commodity and start to industrialize production, leading to employment, skill enhancement, and general sophistication of the sector.
Description of Main Activities	***Processing and Packaging:*** Concentration on the vegetable sector, which would leading to improvement in handling, storage and sale of the more perishable items. Value adding activities such as juicing and further processing. Small scale juicing plants and cleaning houses are envisaged which would allow local juices to substitute for expensive imports. ***Infrastructure:*** Initially this could be in the form of small-scale markets with water services included. If individuals/communities can appoint market "masters" to manage the markets as an enterprise this may lead to sustainable continuation of the project. ***Micro-Projects Programme (MPP) and Micro-Credit System.*** A micro-projects programme (MPP) can be used as a means to support numerous small-scale projects where the need is highest. In some cases these can be community driven or if credit related, privately targeted. The establishment of a managed Micro-Credit Fund to support local initiative and fill temporarily an absence of reliable banking lines of credit for small and micro-enterprises could be opened up and information shared more widely and transparently.
Expected Result(s)	It is expected that with substantial investment some of the basic industrial activities associated with agriculture can kick-start a higher economic turnover much needed to act as a point of interest for entrepreneurs, investors and start to reduce poverty, food insecurity and unemployment.
Impact on Food Security, Poverty Reduction and Economic Development	Building processing factories, infrastructure and making funding small projects in communities will employ people, increase the amount of money available in the local economies and generally lead to a feeling of hope for a better future.
Period of Execution	Medium Term (5 to 10 years)
Estimated Cost	US$ 24 000 000

ANNEX 1

LIST OF DOCUMENTS REVIEWED

CAAS Liberia Programmes. 2004. Situation Report, Humanitarian Coordination Section of UNMIL 8-14 October 2004. Back to Office Reports.

- Dunstan S. C. Spencer – Team Leader - Launching Mission - Back To Office Report, August 8, 2008.
- Chet Aeschliman, Rural Finance and Marketing Officer, RAFA, 30 July - 13 August 2006.
- Sampson Agodzo - Land And Water Management Study – August 2006.
- Ousman K.L. Drammeh - International Fisheries Consultant, 1 - 15 August 2006.
- Zakary Rhissa, Livestock and Animal Production component - Livestock Policy Officer, RAFP/AGA, 30 July – 13 August, 2006.
- Peter Smith - Institutions Consultant – 27 July - 12 August 2006.
- Thomas Lovell - Mechanization And Post Harvest Study, 30 July - 18 August.

FAO. 2006. Strategic Objective: Ensure Food Security.

FAO. 2006. Strategic Objective: Support the Transition from relief (Emergency) to Recovery.

FAO. 2005. Agricultural Policy and Food Security in Liberia, James Tefft, ESA Working Paper No: 05-11. Agricultural and Development Economics Division.

FAO. Country Profiles and Mapping Information System: http://www.fao.org/countryprofiles

FAO. Statistical database: www.FAOSTAT.fao.org

FAO/WFP. 2006. Crop and Food Security Assessment for Liberia, 27 February 2006.

FAO. 2006. Comprehensive Food Security and Nutrition Survey (CFSNS), Liberia 2006, Stakeholders: MOA, MOH, MOE, MPEA, LISGIS, Ministry of Internal Affairs, FAO, HIC, UNICEF, UNMIL, WFP, WHO, CRS, GTZ, World Vision, Draft.

FAO-RAF. 2006. Draft - Report on Liberia's Rural Finance and Agricultural Marketing Sub-Sectors, Aeschliman, Rural Finance and Marketing Officer, RAFA.

FAO/WORLD BANK. 2006. Liberia Agriculture Sector Review in a Post Conflict Country - Concept Note World Bank/FAO.

Fianu, F. K. 2006. "Liberia: Short-Medium Term Action Plan For Crop-Livestock Rehabilitation", FAO Ghana.

Interim Poverty Reduction Strategy (iPRSP). 2006. First Draft, Republic of Liberia, July 2006.

Ministry of Agriculture. 2006. "Liberia – Statement of Policy Intent for Agriculture", "Action Plan to Enhance Agricultural Sector Contribution to Economic Recovery and Food Security in Liberia".

Mary Morgan. 2005. BDS Consultancy Report, "Cowpea Sub Sector Approach", MercyCorps – Liberia.

National Transitional Government of Liberia. 2005. National Budget, for the Fiscal Year July 1, 2004 June 30 2005. "Blue Book" – Agricultural Strategy Sector Plan.

National Human Development Report. 2006 – UNDP, Mobilising Capacity for reconstruction and Development, Monrovia.

Parker David. 2001. Programme Adviser, European Commission, Resettlement and Reintegration Programme, of the Second Liberia Rehabilitation Programme, "Farm Management Survey Of Liberian Smallholder Tree And Food Crops".

Sturgeon Timothy J. 2001. How Do We Define Value Chains and Production Networks, Industrial Performance Centre, Massachusetts Institute of Technology, sturgeon@mit.edu, Published in IDS Bulletin, Vol 32, No 3, 2001.

Syrulwa Samah. 2003. Short paper: "Promoting Agricultural production in the New Liberia", Dr, A&T State University, North Carolina.

Tracy Gerstle. 2006. Market Development Approach: CPBD Program Fresh and Dried Hot Pepper Value Chains, Economic and Enterprise Development, June 2006, MercyCorps – Liberia.

UN/World Bank. 2004. Liberia – Joint Needs Assessment – Sector Working Paper: Livelihoods and Employment Generation, February 2004, UN/World Bank – Unofficial Draft Document.

World Bank. 2006. World Bank commissioned study: The Evolution of Agricultural Education and Training: Global Insights of Relevance for Africa, Carl K. Eicher, Michigan State University.

World Bank. 2006. "Liberia Agriculture Sector Review - In A Post Conflict Country – Concept Note".

ANNEX 2

PEOPLE MET

Name	Organisation	Position
Government		
Dr Christopher Toe	Ministry of Agriculture	Minister for Agriculture
James Logan	Ministry of Agriculture	Deputy Minister
L. Kandakai	Ministry of Agriculture	Deputy Minister, Regional Development, Research and Extension
Alfred F. Kotio	Forestry Development Authority	National Authorising Officer, Commissions
James Zayzay	National Investment Centre (NIC)	Acting Head
William Q. Menyen	MoA, Nimba County	District Agricultural Officer,
Gertre Soluntea,	MoA, Cuttington, Bong County	County Agricultural Coordinator,
Daniel S. Gbigbi	CARI-Seed Multiplication Project	Officer in Charge,
John Woods	Forestry Development Authority	Managing Director
Jangar S. Kamara	Forestry Development Authority	Technical Manager Designate for Commercial Forestry
Garmai Wolokollie	Forestry Development Authority	Acting Head
Haris Wennie	Cooperation Development Authority (CDA)	Deputy Registrar
CAAS-LIB Team Members		
Dr Othello Brandy	CAAS-LIB	National Coordinator
Dr Dunstan Spencer	CAAS-LIB	Team Leader
Franklin Henries	CAAS-LIB	Counterpart - Food Crops
Jallah Kennedy	CAAS-LIB	Counterpart - Institutional Development
Paul Jallah	CAAS-LIB	Counterpart - Institutional Development
NGOs, Farmers and Cooperatives		
Lucia Bass	Independent Farmer on WFP Food-for-Work Programme	Farmer, Bong County
MacArthur M. Pay-Bayee	International Institute of Tropical Agriculture (IITA)	Project Manager – Sustainable Tree Crop Program
Arthur Flomo	Dokodan Cooperative	President
Thomas Gbuabaye,	Africare Liberia	Agricultural Production
Offerce N. Kpokolo	NGO - Nimbaian Bangladeshi Agricultural Project, Kapain District	Project Manager
James Jiazoli	World Vision	Agricultural Manager – Food Security
Tom Ewert	MercyCorps	Country Director

Donor Staff and Donor Funded Projects		
Joseph Boiwu	FAO – Liberia	Assistant Resident Representative (Officer In Charge) – Operations
Thomas Palmer	FAO – Regional Office Ghana	Senior Policy and Programme Officer
Chris Jackson	World Bank	Consultant – Policy Analysis
Chet Aeschliman,	FAO Regional Officer for Africa, Accra, Ghana	Rural Finance and Marketing Officer
Kay Schwendinger	UNDP – Liberia	Strategic Partnerships Officer – Liberia
Mohamed Khaled	FAO – Liberia	Emergency Coordinator
Robert Krech	World Bank	Consultant
Emmet Watson	UNDP – Liberia	Assistant Resident Representative
Indu Bhushan Gautam	UNDP Programme	Reintegration and Participatory Development Manager – Community Based Reintegration Recovery Programme
Robert Krech	World Bank – Liberia	Consultant
Liam McGuire	EU – Community Development Programme	Team Leader
Paul Woods	EU – Community Development Programme	Contracts, Finances and Administration

ANNEX 3

METHODOLOGY AND KEY FINDINGS

Methodology

Two teams of six enumerators and one supervisor conducted the survey. The survey was designed before hand.

Given poor road conditions at the time of this survey it made impossible to visit all counties. The survey instead covered a number of significant agricultural producing counties to derive a balanced view of production from low to high producers within each county.

Bong and Nimba counties were chosen to represent high production areas. Grand Cape Mount County represented one of the counties with intermediate food production whilst Grand Kru, Grand Gedeh and Maryland counties displayed low productivity and whose foodstuff comes mainly from Côte d'Ivoire and Guinea.

The six enumerators were divided into two teams of three as shown in Table 1 and 2 below:

- Team One consisted of Sam Guwor (Vegetables), Toe Williams (Root Crops) and David Vienn (Rice). They visited 36 towns in Bong, Grand Cape Mount and Nimba Counties. The Table below shows the towns visited.
- Team Two consisted of James Newman (Root Crops), Alex Mulbah (Vegetables) and Henry Bundor (Rice). They visited the southeast region and covered 19 towns. Due to poor roads, many towns were reached only by walking.

Table 1 - Counties and Towns Visited by Team One

County	Town
Bong	Balayeamah, Dulimue, Duta, Gbonota, Gbonoyea, Gowhua, Kpalainta, Lehleh, Naama, Suakoko, Warta, Yatala
Grand Cape Mount	Dowula, Gohnzodua, Kpeneji, Madina, Njagbacca, Sinje, Torsor, Vonzuanla
Nimba	Duowine, Gbedin, Karnplay, Kpaituo, Kpankatuo, Karnplay, Layee, Manbor Gbe, Nengbehn, Sanniquellie, Suazua, Voley, Yarsonnoh, Zaanpea, Zogowee, Zontuo

Table 2 – Counties and Towns Visited by Team Two

County	Towns Visited
Grand Gedeh	Pouh Town, Zai Town, Zwedru
Grand Kru	Barclayville, Chanakalle, Filoken, Kayken, Picnic Cess Setor, Topoe
Maryland	Barraken, Bishop Hill, Easy Town, Fish Town, Gbolobo Harper East, High Wood, Philadelphia, Plebo, Sawonken, Seldeken

The enumerators were not able to reach Grand Gedeh County because of transportation difficulties. The Supervisor supplemented the above survey with interviews with traders and input suppliers and met with farmer groups in three towns in Grand Gedeh County.

Findings

The following tables present key findings generated by the survey for each commodity and in each county visited.

Out of the total number of farmers interviewed, 64% were engaged in upland rice farming while 28% cultivated in the lowlands. 8% of farmers cultivated both upland and lowlands (a practice usually employed to safeguard against adverse weather conditions and by farmers who had a late start in the season). Farmers in the South Eastern region were also seen to carry out parboiling of rice after harvest to reduce the percentage of broken grains when milling. Table 3 (a) below shows distribution per county for rice production.

Table 3 (a) – Rice Production

County	Lowland	Upland	Lowland/ Upland	Parboiling	Trader
Bong	44%	56%	0	22%	0
Grand Cape Mount	35%	65%	0	17%	0
Grand Gedeh*	0	0	0	0	2
Grand Kru	12%	59%	29%	76%	0
Maryland	22%	67%	11%	71%	2
Nimba	28%	72%	0	39%	2
Total	141%	319%	40%	225%	6
Mean	28%	64%	8%	45%	

Table 3 (b) shows that 80% of root crops farmers grew cassava (the second staple crop after rice), while 16% were engaged in the production of plantain, and 4 in cocoyam cultivation. Some value addition in the form of cassava flour processing, fufu and gari was seen, with the production of gari being the major product produced by 35% of farmers, followed by fufu at 19% and only 1% of farmers in Nimba County producing cassava flour.

Table 3 (b) - Root Crop Production

County	Cassava	Cocoyam	Plantain	Flour	Fufu	Gari	Trader
Bong	72%	6%	22%	0	5%	17%	0
Grand Cape Mount	100%	0	0	0	0	73%	1
Grand Gedeh*	0	0	0	0	0	0	0
Grand Kru	94%	6%	0	0	38%	44%	0
Maryland	90%	10%	0	0	50%	40%	1
Nimba	44%	0	56%	5%	0	0	0
Total	400%	22%	78%	5%	93%	174%	2
Mean	80%	4%	16%	1%	19%	35%	

As shown in Table 4 below, 54% of the vegetable farmers interviewed grew bitter balls and pepper in mixed stand with upland rice during the rainy season, followed by 37% of pepper and 9% bitter balls grown in pure stands. The Table also shows Nimba and Bong Counties as the highest producers of these commodities – 72% and 67% respectively. Bitterballs are grown by 61% of farmers in Maryland county.

Table 4 – Vegetable Production

County	Bitterballs	Pepper/ Bitterballs	Pepper	Trader
Bong	33%	67%	0	0
Grand Cape Mount	0	39%	61%	1
Grand Gedeh*	0	0	0	3
Grand Kru	0	31%	69%	0
Maryland	10%	61%	29%	2
Nimba	0%	72%	28%	0
Total	43%	270%	187%	6
Mean	9%	54%	37%	

Summary of Survey

a) Number of Interviews by County and Sector

a) Farmers	**Number Interviewed**	**%**
Bong	31	23%
Maryland	24	18%
Grand Cape Mount	25	19%
Grand Kru	16	12%
Nimba	39	29%
Total	**135**	
b) Input Suppliers	**Number Interviewed**	**%**
Maryland	6	67%
Nimba	1	11%
Grand Gedeh	2	22%
Total	**9**	
c) Traders	**Number Interviewed**	**%**
Maryland	3	38%
Grand Gedeh	4	50%
Cape Mount	1	12%
Total	**8**	
Overall Total Number of Interviews	**152**	

Note: Numbers have been rounded.

b) Size of farms of Commodity Producers (135 farmer respondents)

Farm size in Has	Number	%
Up to 2 has	120	88.9%
2 to 3 has	12	8.9%
3 to 4 has	2	1.5%
> 4 has	1	0.7%
Total	**135**	**100%**

c) A few key Characteristics of Farmers Interviewed (135 farmer respondents)

Commodities being farmed		
	Number	**%**
Upland Rice	35	26%
Bitterball/Plantain	28	21%
Plantain	21	16%
Lowland Rice	19	14%
Cassava	15	11%
Bitterball	8	6%
Bitterball/Plantain/Other Veg.	7	5%
Other Vegetable/Plantain	1	1%
Other Vegetable	1	1%
Total	**135**	

Labour Source		
	Number	**%**
Family	124	92%
Casual	8	6%
Hire	1	1%
None	1	1%
Family/Hire	1	1%
Total	135	100%

Processing		
	Number	**%**
Gari Preparation	9	7%
Ground pepper	5	4%
Ground okra	1	1%
2 and 3	0	0%
Milling	7	5%
Parboiling	4	3%
Cassava dough	0	0%
Cassava flour	0	0%
None	109	81%
Total	135	

Does the farmer do any processing?		
	Number	**%**
Yes	27	20%
No	108	80%
Total	135	100%

Where do you sell?		
	Number	**%**
Farm gate	28	21%
Market	22	16%
Direct Trader	0	0%
Farm gate/Market	2	1%
Market/Direct Trader	10	7%
Direct Trader/Farm Gate	45	33%
None	28	21%
Total	135	

Who do you sell to?		
	Number	**%**
Another farmer	63	47%
Trader	35	26%
Another farmer/Trader	8	6%
None	29	21%
Total	135	

Do you take to market?		
	Number	**%**
Yes	75	56%
No	58	43%
N/A	2	1%
Total	135	100%

Transportation Means		
	Number	**%**
Walk	40	30%
None	62	46%
Other	33	24%
Total	135	

Future Plan		
	Number	**%**
Continue Farming	40	30%
Expand Farm	66	49%
Uncertain	1	1%
Plant Cassava & rice	1	1%
Plant Cassava	2	1%
Tree crops	4	3%
Education	14	10%
Improve production	2	1%
Support Family	2	1%
Build home	2	1%
Marketing	1	1%
Total	135	

Summary Table of Sales/Home Consumption		
	% of commodity for Home	**% of commodity for Sale**
Lowland Rice	62%	38%
Plantain	58%	42%
B - P - OV*	56%	44%
Upland Rice	46%	53%
Bitterball/Plantain	43%	55%
Cassava	37%	63%
Bitterball	32%	68%
Total (average of total)	**48%**	**52%**

*Bitterball/Plantain/Other Vegetables.

d) Input Supplier Questions and Findings (9 respondents)

Who do you deal with when selling items?		
	Number	**%**
Farmer directly	2	22%
Other	1	11%
Both farmer and other	6	67%
Total	9	

Do you provide any other services?		
	Number	**%**
Credit	3	33%
Advice	0	0%
Other	0	0%
No	6	67%
Total	9	

Other competition?		
	Number	**%**
Other local traders	3	33%
National travelling sales	0	0%
Foreign traders	1	11%
None	5	56%
Total	9	

How many employees do you have?		
	Number	**%**
0	3	33%
1	1	11%
2	4	44%
3	1	11%
Total	9	

e) Trader Questions and Responses (8 respondents)

How many employees do you have?		
	Number	**%**
0	5	62.5%
1	2	25.0%
2	1	12.5%
Total	8	

Do you buy in bulk?		
	Number	**%**
Yes	7	87.5%
No	1	12.5%
Total	8	

What do you buy?			
	Number	**%**	
Processed*	2	25%	* fufu or gari
Fresh vegetables**	4	50%	** e.g. okra
Rice	2	25%	
Total	8		

Do you do any form of processing?			
	Number	**%**	
Yes*	1	13%	*packaging.
No	7	88%	
Total	8		

Plans for the Future One Year Hence		
	Number	**%**
Expand	4	50%
Expand Volume and range	3	38%
Continue business	1	13%
Total	8	

ANNEX 4

VALUE CHAIN SURVEY – QUESTIONNAIRE EXAMPLES

VEGETABLE SURVEY

SECTION 1: PRODUCTION ENTERPRISE

Vegetable Type:				
Date:				
Name of Farmer:				
Location (Village, County):				
Size of farm:				**Hectares**
Production				
Inputs:				
Seed price:		(Lib $)/kg		Qty bought (kg)
Other inputs and cost:				
Fertilizer		Lib $/kg		Units bought
Pesticide		Lib $kg		Units bought
Other		Lib $kg		Units bought
		Lib $kg		Units bought
Other costs:				
Land rent				
Hire Labour		Lib $/day		Number of days
Storage		Lib $/day		Number of days
Outputs:				
Production		Total Kgs		
How much is for home consumption?		%		
How much is for sale?		%		
Sale price		Lib $		
Profit		Lib $		

SECTION 2: VALUE ADDITION/PROCESSING

Processing		
Is there any processing?		
What processing takes place?		
What are the costs of processing?		Lib $ (also list item)
What inputs are required for processing?		Inputs
What price do you sell after processing?		Lib $/kg or per item

SECTION 3: SWOT ANALYSIS OF THE ENTERPRISE

Strengths	Weaknesses	Opportunities	Threats

SECTION 4: MARKETING QUESTIONS

Where do you sell your vegetable?		e.g. farm gate, market, direct to trader
Who do you deal with?		e.g. another farmer? Trader?
How many times do you sell?		
Do you take the produce to market? What are the transportation costs		

SECTION 5: PLAN FOR THE FUTURE

What plans are there for the future?	
One year:	
Two years?	

INPUT SUPPLIER SURVEY

SECTION 1: PRODUCTION ENTERPRISE

Date:	
Name of Trader:	
Location (Village, County):	
Number of employees:	

SECTION 2: BUSINESS RELATED

What do you sell?		E.g. tools, seeds, fertilizers, other
List a few items and their costs:		
Tools		Lib $ per item e.g. spades
Seeds:		Lib $ per kg (or 50 kg bags)
Rice Seed		Lib $ per kg (or 50 kg bags)
Vegetable Seed		Lib $ per kg (or 50 kg bags)
Cassava cuttings		Lib $ per kg (or 50 kg bags)
Fertilizer		Lib $ per kg (or 50 kg bags)
Other inputs e.g.		
insecticides/pesticides?		

SECTION 3: SWOT ANALYSIS OF THE ENTERPRISE

Strengths	Weaknesses	Opportunities	Threats

SECTION 4: MARKETING QUESTIONS

Do you advertise your shop?		Posters, word of mouth etc
Who do you deal with?		e.g. direct with farmers? Other traders? Cooperatives?
Do you provide any support services to farmers?		
Do you sell commodities for farmers?		
What competition do you see in your area?		E.g. other traders in the village or town

SECTION 5: PLAN FOR THE FUTURE

What plans are there for the future?	
One year?	
Two years?	

ANNEX 5

CASE STUDIES

Case Study 1:

Maryland County - *Philadelphia Swamp Rice project - Harper*

The Philadelphia swamp rice project commenced in 1964, with assistance from the Governments of Taiwan and Liberia. Initial development work covered 100 acres out of a total of 190 acres. 31 farmers were trained in lowland rice cultivation.

Seed stocks were lost as a result of the war, but donors (such as the EU, LWS and WFP) have donated seeds to these farmers and supported by the WFP Food-for-Work-Programme. The rice variety grown here is "Suakoko 8" which is able to combat the high iron toxicity in the soil.

FAO emergency assistance implemented through the Southeastern Agricultural Relief Agency (SARA), a local NGO, had some setbacks including seeds that did not germinate, and poor quality of tools distributed to them. Current yield figures are quite low as these fields are cultivated without the application of fertilizer. Crop yield is between 1,500-2,000kg/ha as compared to the 3,000-4,000kg/ha in the pre-war years. This group of farmers provide milling services to the community as well as satellite towns and villages.

The Philadelphia farmers were equipped with one rice mill, three power tillers, four threshers and two hand-operated winnowers. Sickles were used for harvesting. Government initially provided maintenance and spare parts. Farmers provided fuel and a small fee L$12.00/acre for two ploughing operations or $6.00 per single operation. All equipment was stolen during the war, although recently a rice mill has been donated to the group by the Lutheran World Service (LWS) to reactivate post harvest activities.

Normal post harvest activities are beginning to take place, although little value addition (parboiling) is generated. Major problems faced by the farmers include bird damage and weed control (the dam is not functioning well and as the paddy fields cannot be flooded at some part of the season, weeds have become a problem).

Case Study 2:

Grand Gedeh County - *Work and See Farmers Cooperative Society – Zwedru*

The Work and See Farmers Cooperative Society was established in 1973 primarily to produce swamp rice and vegetables. This cooperative has nine members on the Board of Directors as well as a management team. It is structured in a way that each farmer is given several plots according to their ability to utilize the land. They are assessed as their proper use. In cases where plots are not utilized, adjustments are made and excess land is given to either new members or members with spare capacity to expand their cultivation. This is done mainly to ensure vacant space in not left in the field.

Payment to the cooperative is made in the form of in-kind as opposed to cash. Proceeds accrued from the sales of the in-kind dues, are used to purchase tools and other inputs and which are then stored in a "tools bank", which members can access on a sign-and-return basis. The cooperative also provides seeds to new members to get them started. Payment of dues was suspended during the war, but there are plans to reactivate this before the end of 2006.

In the past the cooperative had one rice mill (which provided service to the members and the general public), one mini tractor and two power tillers (donated by GoL). Farmers sold rice to the immediate community and kept some for household consumption. The civil war disrupted farming until only this year. The cooperative has a current membership of 373 farmers (comprising 230 men and 143 women).

Currently, German Agro Action (GAA) is assisting to rehabilitation of canals and floodways. Initial clearing was carried out by AGRIMECO (approximately 500 acres of lowland was cleared and 85% of which is currently under cultivation). GAA donated a new rice mill to the cooperative, which, will be supervised and monitored by a committee comprised of MOA, GAA and the cooperative. WFP has also contributed a food-for-work ration to the cooperative. Since the war no fertilizer has been applied.

If the harvest is successful, the members will consider strongly the introduction of fish farming and beekeeping.

Case Study 3:

Pouh Town: ***NAWOCOL***

NAWOCOL is female run CBO established in 1999 to help returnees with agricultural planting materials and assistance to the vulnerable in the community with local food (cassava and vegetables). The organization has been operating on a self-help basis and charges no membership fees. Contributions made by members to the organization are used to purchase office stationery.

The organization worked well up until 2001; and has since 2001-2006 it has been dormant due to the civil conflict that engulfed the southeast. After a 6 year lag period the member resumed operation in August 2006, cultivating 5 acres of vegetables for this dry season, and base upon the success of this cropping cycle, the membership intend to engage into the cultivation of 200 acres of assorted food crops. Membership stands at 80. The organization lacks farm inputs (tools, equipment, and seeds/planting materials) and technical support but is able to pay for some technical assistance.

ANNEX 6

DRC CALCULATIONS (US$)[59]

Model 1: Average Rice Producer (Bong)

A: Budget for Upland Rice (Bong)

Farmed area (ha) Commerical 1.4

	Unit	Value per unit	% of which goes for business sale	Quantity	Total Cost		Total Cost per season
COSTS							
Rice inputs home grown (bucket = 10kg)	Bucket	10.00	21%	3.00	-		-
Rice inputs purchased (bucket = 10kg)	Bucket	10.00	21%	3.00	6.30		6.30
Fertlizer purchase (50kg bags)	Kg	44.00	21%	1.00	9.24		9.24
Labour	Labour	40.00	21%	1.00	8.40		8.40
Land rental	Ha	16.00	21%	1.00	3.36		3.36
						Total Costs	**27.30**
REVENUE					**No of Ha**	**Production Volume in Kg**	**Value**
Total production	Kg	0.20		588.00	1.4	823.2	164.64
Production of which:							
79% is for home consumption	Kg	0.20	79%	464.52	1.4	650.328	130.07
21% is for sale	Kg	0.20	21%	123.48	1.4	172.872	34.57
						Income from Sales	**34.57**
						Profit	**7.27**

B: Policy Analysis Matrix (PAM) for an Upland Rice Farmer for 21% of production

	Units	Quantities A	Quantities B	Market Prices	Conversion Factors	Social Prices	Market Values	Social Values	Transfers
REVENUE									
Rice Sales	Kg	1	172.87	0.20			34.57		
Import Parity	Kg	1	172.87	0.40	1.00	0.40		69.15	-35
						TOTAL REVENUE	**34.57**	**69.15**	**-35**
COSTS: Non-Tradable Inputs									
Labour	Labour	1.00	21%	40.00	4.50	180.00	8.40	37.80	-29.40
Land rental	Ha	1.00	21%	16.00	5.00	80.00	3.36	16.80	-13.44
						TOTAL NON-TRADABLE COSTS	**11.76**	**54.60**	**-42.84**
COSTS: Tradable Inputs		Qty	% Used						
Rice inputs purchased (bucket = 10kg)	Bucket	3.00	21%	10.00	2.00	20.00	6.30	12.60	-6.30
Fertlizer purchase (50kg bags)	bag of 44Kg	1.00	21%	44.00	2.00	88.00	9.24	18.48	-9.24
						TOTAL TRADABLE COSTS	**15.54**	**31.08**	**-15.54**
						OVERALL TOTAL COSTS	**27.30**	**85.68**	**-58.38**
							PRIVATE	*SOCIAL*	
						Profit (REVENUE)	**7.27**	**-16.53**	

INDICATORS	RATIOS	CALCULATIONS
Private Profits (USD/kg) (PP)	7.27	PP = (Private Revenue - Overall Costs @ market prices)
Social Profits (USD/kg) (SP)	-16.53	SP = (Social Revenue - Overall Costs @ social prices)
Private Cost Ratio (PCR)	0.62	PRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices
Domestic Resource Cost Ratio (DRC)	**1.43**	DRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices
Nominal Protection Coefficient (NPC)		
- On tradable Outputs	50.00%	NPC^{TO} = (Private Revenue @ market prices) / (Social Revenue @ social prices)
- On tradable Inputs	50.00%	NPC^{TI} = (Tradable Costs @ market prices) / (Tradable Costs @ social prices)
Effective Protection Coefficient (EPC)	50.00%	EPC = (Private Revenue - Tradable Costs @ market prices) / (Soc Rev - Trad Costs @ social prices)

[59] The data on which these matrixes have been compiled have been based are tables 8, 9 and 10 in the body of this report as well as the database of the survey undertaken.

Model 2: Average Lowland Rice Producer (Nimba)

A: Budget for Lowland Rice (Nimba)

Farmed area (ha) Commerical 1.6

	Unit	Value per unit	% of which goes for business sale	Quantity	Total Cost		Total Cost per season
COSTS							
Rice inputs home grown	Kg	10.00	89%	50.00	-		-
Rice inputs purchased (per bundle)	Bundle	0.28	89%	100.00	24.92		24.92
Fertlizer use (50kg bag)	Bag	44.00	89%	1.00	39.16		39.16
Labour	Labour	1.72	89%	6.00	9.18		9.18
Land rental	Ha	-	89%	1.00	-		-
Other costs - processing	Unit	16.81	89%	1.00	14.96		14.96
Marketing (transportation)	Unit	100.00	100%	1.00	100.00		100.00
						Total Costs for production	**188.23**
REVENUE				**Per Ha**	**No of Ha**	**Production Volume in Kg**	**Value**
Total production	Kg	0.22		656.00	1.6	1049.6	230.91
Production of which:							
11% is for home consumption	Kg	0.22	11%	72.16	1.6	115.456	25.40
89% is for sale	Kg	0.22	89%	583.84	1.6	934.144	205.51
						Income from Sales	**205.51**
						Profit	**17.29**

B: Policy Analysis Matrix (PAM) for an Upland Rice Farmer for 89% of production for sale

	Units	Quantities		Market Prices	Conversion Factors	Social Prices	Market Values	Social Values	Transfers
		A	B						
REVENUE									
Rice Sales	Kg	934.14	1.00	0.22			205.51		
Import Parity	Kg	934.14	1.00	0.60	1.00	0.60		560.49	-354.97
						TOTAL REVENUE	**205.51**	**560.49**	**-354.97**
COSTS: Non-Tradable Inputs									
Labour	Labour	6.00	0.89	1.72	1.00	1.72	9.18	9.18	0.00
Land rental	Ha	0.00	1.00	-	1.00	-	-	0.00	0.00
Other costs - processing	Unit	1.00	0.89	16.81	2.00	33.62	14.96	29.92	-14.96
Marketing (transportation)	Unit	1.00	0.89	100.00	1.10	110.00	89.00	97.90	-8.90
						TOTAL NON-TRADABLE COSTS	**113.15**	**137.01**	**-23.86**
COSTS: Tradable Inputs			% Used						
Rice inputs purchased (per bundle)	Bundle	100.00	0.89	0.28	1.10	0.31	24.92	27.41	-2.49
Fertlizer use (50kg bag)	Bag	1.00	0.89	44.00	1.10	48.40	39.16	43.08	-3.92
						TOTAL TRADABLE COSTS	**64.08**	**70.49**	**-6.41**
						OVERALL TOTAL COSTS	**177.23**	**207.49**	**-30.27**
							PRIVATE	*SOCIAL*	
						Profit (REVENUE)	**28.29**	**352.99**	

INDICATORS	RATIOS	CALCULATIONS
Private Profits (USD/kg) (PP)	28.29	**PP = (Private Revenue - Overall Costs @ market prices)**
Social Profits (USD/kg) (SP)	352.99	**SP = (Social Revenue - Overall Costs @ social prices)**
Private Cost Ratio (PCR)	0.80	**PRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices**
Domestic Resource Cost Ratio (DRC)	0.28	**DRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices**
Nominal Protection Coefficient (NPC)		
- On tradable Outputs	36.67%	**NPC^{TO} = (Private Revenue @ market prices) / (Social Revenue @ social prices)**
- On tradable Inputs	90.91%	**NPC^{TI} = (Tradable Costs @ market prices) / (Tradable Costs @ social prices)**
Effective Protection Coefficient (EPC)	28.86%	**EPC = (Private Revenue - Tradable Costs @ market prices) / (Soc Rev - Trad Costs @ social prices)**

Model 3: Average Root Crop Producer (Nimba)

A: Budget for Root Crop Production (Nimba)

Farmed area (ha) 0.6

	Unit	Value per unit	% of which goes for business sale	Quantity	Total Cost		Total Cost per season
COSTS							
Root Crop seed home grown (per bucket = 10kg)	Kg	-	55%	4.00	-		-
Root Crop inputs purchased (per bucket = 10kg)	Kg	3.19	55%	6.00	10.53		10.53
Fertlizer purchase (50kg bags)	Kg	-	55%	-	-		-
Labour	Labour	29.00	55%	1.00	15.95		15.95
Land rental	Ha	29.00	55%	1.00	15.95		15.95
						Total Costs	**42.43**
REVENUE					**No of Has**	**Production Volume in Kg**	**Value**
Total production	Kg	0.06		7,188.00	0.60	4,312.80	258.77
Production of which:							
45% is for home consumption	Kg	0.06	45%	3,234.60	0.60	1,940.76	116.45
55% is for sale	Kg	0.06	55%	3,953.40	0.60	2,372.04	142.32
						Income from Sales	**142.32**
						Profit	**99.90**

B: Policy Analysis Matrix (PAM) for Root Crop Production (Nimba) for 55% sale production

	Units	Quantities		Market Prices per unit	Conversion Factors	Social Prices	Market Values	Social Values	Transfers
		A	B						
REVENUE									
Rice Sales	Kg	2,372.04	1.00	0.06			142.32		
Import Parity	Kg	2,372.04	1.00	0.10	1.00	0.10		237	-95
						TOTAL REVENUE	**142**	**237**	**-95**
COSTS: Non-Tradable Inputs									
Labour	Labour	0.55	1.00	29.00	1.00	29.00	15.95	15.95	0.00
Land rental	Ha	0.55	1.00	29.00	1.00	29.00	15.95	15.95	0.00
						TOTAL NON-TRADABLE COSTS	**31.90**	**31.90**	**0.00**
COSTS: Tradable Inputs									
Root Crop inputs purchased (per bucket = 10kg)	Kg	10.53	1.00	3.19	1.10	3.51	10.53	36.94	-26.41
Fertlizer purchase (50kg bags)	Kg	-	1.00	-	1.10	-	-	-	-
						TOTAL TRADABLE COSTS	10.53	36.94	-26.41
						OVERALL TOTAL COSTS	**42.43**	**68.84**	**-26.41**
							PRIVATE	*SOCIAL*	
						Profit (REVENUE)	**99.90**	**168.36**	

INDICATORS	RATIOS	CALCULATIONS
Private Profits (USD/kg) (PP)	99.90	PP = (Private Revenue - Overall Costs @ market prices)
Social Profits (USD/kg) (SP)	168.36	SP = (Social Revenue - Overall Costs @ social prices)
Private Cost Ratio (PCR)	0.24	PRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices
Domestic Resource Cost Ratio (DRC)	**0.16**	DRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices
Nominal Protection Coefficient (NPC)		
- On tradable Outputs	60%	NPC^{TO} = (Private Revenue @ market prices) / (Social Revenue @ social prices)
- On tradable Inputs	28%	NPC^{TI} = (Tradable Costs @ market prices) / (Tradable Costs @ social prices)
Effective Protection Coefficient (EPC)	66%	EPC = (Private Revenue - Tradable Costs @ market prices) / (Soc Rev - Trad Costs @ social prices)

Model 4: Average Vegetable Producer (Grand Cape Mount)

A: Budget for Vegetable Production (Grand Cape Mount)

Farmed area (ha) 0.8

	Unit	Value per unit	% of which goes for business sale	Quantity	Total Cost		Total Cost per season
COSTS							
Seeds home grown (per bucket = 10kg)	Kg	10.00	80%	3.00	-		-
Seeds inputs purchased (per bucket = 10kg)	Kg	9.11	80%	1.00	7.29		7.29
Fertlizer purchase (50kg bags)	Kg	13.46	80%	1.00	10.77		10.77
Labour	Labour	23.00	80%	1.00	18.40		18.40
Land rental	Ha	26.00	80%	1.00	20.80		20.80
						Total Costs	**57.26**
REVENUE					**No of Has**	**Production Volume in Kg**	**Value**
Total production	Kg	0.72		1418.00	0.8	1134.40	816.77
Production of which:							
20% is for home consumption	Kg	0.72	20%	283.60	0.16	45.376	32.67
80% is for sale	Kg	0.72	80%	1,134.40	0.64	726.016	522.73
						Income from Sales	**522.73**
						Profit	**465.48**

B: Policy Analysis Matrix (PAM) for Vegetable Production (Grand Cape Mount) for 80% sale production

	Units	Quantities A	Quantities B	Market Prices	Conversion Factors	Social Prices	Market Values	Social Values	Transfers
REVENUE									
Vegetable Sales	Kg	726.02	1.00	0.72			522.73		
Import Parity	Kg	726.02	1.00	1.70	1.00	1.70		1234.23	-711.50
						TOTAL REVENUE	**522.73**	**1,234.23**	**-711.50**
COSTS: Non-Tradable Inputs									
Labour	Labour	0.80	1.00	23.00	1.00	23.00	18.40	23.00	-4.60
Land rental	Ha	0.80	1.00	26.00	1.00	26.00	20.80	26.00	-5.20
						TOTAL NON-TRADABLE COSTS	**39.20**	**49.00**	**-9.80**
COSTS: Tradable Inputs									
Seeds inputs purchased (per bucket = 10kg)	Kg	0.80	1.00	9.11	1.10	10.02	7.29	10.02	-2.73
Fertlizer purchase (50kg bags)	Kg	0.80	1.00	13.46	1.10	14.81	10.77	14.81	-4.04
						TOTAL TRADABLE COSTS	**18.06**	24.83	-6.77
						OVERALL TOTAL COSTS	**57.26**	**73.83**	**-16.57**
							PRIVATE	*SOCIAL*	
						Profit (REVENUE)	**465.48**	**1,160.40**	

INDICATORS	RATIOS	CALCULATIONS
Private Profits (USD/kg) (PP)	465.48	**PP = (Private Revenue - Overall Costs @ market prices)**
Social Profits (USD/kg) (SP)	1,160.40	**SP = (Social Revenue - Overall Costs @ social prices)**
Private Cost Ratio (PCR)	0.08	**PRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices**
Domestic Resource Cost Ratio (DRC)	**0.04**	**DRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices**
Nominal Protection Coefficient (NPC)		
- On tradable Outputs	42.35%	**NPC^{TO} = (Private Revenue @ market prices) / (Social Revenue @ social prices)**
- On tradable Inputs	72.73%	**NPC^{TI} = (Tradable Costs @ market prices) / (Tradable Costs @ social prices)**
Effective Protection Coefficient (EPC)	41.73%	**EPC = (Private Revenue - Tradable Costs @ market prices) / (Soc Rev - Trad Costs @ social prices)**

Model 5: Average Bitterball, Plantain and Other Vegetable Producer (Maryland)

A: Budget for Bitterball, Plantain and Other Vegetable Production (Maryland)

Farmed area (ha) 0.8

	Unit	Value per unit	% of which goes for business sale	Quantity	Total Cost		Total Cost per season
COSTS							
Seeds home grown (per bucket = 10kg)	Kg	10.00	40%	3.00	-		-
Seeds inputs purchased	Bundle	8.62	40%	2.00	6.90		6.90
Fertlizer purchase (50kg bags)	Kg	-	40%	1.00	-		-
Labour	Labour	1.72	40%	9.00	6.19		6.19
Land rental	Ha	-	40%	1.00	-		-
Processing costs	Unit/kg	0.025	40%	400.00	4.00		4.00
						Total Costs	**17.09**
REVENUE					**No of Has**	**Production Volume in Kg**	**Value**
Total production	Kg	0.67		500.00	0.8	400.00	268.00
Production of which:							
60% is for home consumption	Kg	0.67	60%	300.00	0.48	144	96.48
40% is for sale	Kg	0.67	40%	200.00	0.32	64	42.88
						Income from Sales	**42.88**
						Profit	**25.79**

B: Policy Analysis Matrix (PAM) for Bitterball, Plantain and Other Vegetable Production (Maryland) for 40% sale production

	Units	Quantities		Market Prices	Conversion Factors	Social Prices	Market Values	Social Values	Transfers
		A	B						
REVENUE									
Vegetable Sales	Kg	64.00	1.00	0.67			42.88		
Import Parity	Kg	64.00	1.00	1.00	1.00	1.00		64.00	-21.12
						TOTAL REVENUE	**42.88**	**64.00**	**-21.12**
COSTS: Non-Tradable Inputs									
Labour	Labour	9.00	0.40	1.72	1.00	1.720	6.19	6.19	0.00
Land rental	Ha	0.80	1.00	-	1.00	-	-	-	0.00
Processing costs	Unit/kg	400.000	40%	0.025	1.10	0.028	4.00	4.40	-0.40
						TOTAL NON-TRADABLE COSTS	**10.19**	**10.59**	**-0.40**
COSTS: Tradable Inputs									
Seeds inputs purchased	Kg	0.80	1.00	8.62	1.10	9.48	6.90	9.48	-2.59
Fertlizer purchase (50kg bags)	Kg	0.80	1.00	0.00	1.10	0.00	-	-	0.00
						TOTAL TRADABLE COSTS	**6.90**	9.48	-2.59
						OVERALL TOTAL COSTS	**17.09**	**20.07**	**-2.99**
							PRIVATE	*SOCIAL*	
						Profit (REVENUE)	**25.79**	**43.93**	

INDICATORS	RATIOS	CALCULATIONS
Private Profits (USD/kg) (PP)	25.79	**PP = (Private Revenue - Overall Costs @ market prices)**
Social Profits (USD/kg) (SP)	43.93	**SP = (Social Revenue - Overall Costs @ social prices)**
Private Cost Ratio (PCR)	0.28	**PRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices**
Domestic Resource Cost Ratio (DRC)	**0.19**	**DRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices**
Nominal Protection Coefficient (NPC)		
- On tradable Outputs	67.00%	**NPC^{TO} = (Private Revenue @ market prices) / (Social Revenue @ social prices)**
- On tradable Inputs	72.73%	**NPC^{TI} = (Tradable Costs @ market prices) / (Tradable Costs @ social prices)**
Effective Protection Coefficient (EPC)	66.00%	**EPC = (Private Revenue - Tradable Costs @ market prices) / (Soc Rev - Trad Costs @ social prices)**

Model 6: Average Bitterball and Plantain Producer (Maryland)

A: Budget for Bitterball and Plantain Production (Maryland)

Farmed area (ha) 0.4

	Unit	Value per unit	% of which goes for business sale	Quantity	Total Cost		Total Cost per season
COSTS							
Seeds home grown (per bucket = 10kg)	Kg	10.00	34%	3.00	-		-
Seeds inputs purchased (B and P)	Bundle	5.00	34%	10.00	17.00		17.00
Fertlizer purchase (50kg bags)	Kg	-	34%	1.00	-		-
Labour	Labour	20.00	34%	1.00	6.80		6.80
Land rental	Ha	-	34%	1.00	-		-
Marketing costs (transport)	Unit	2.00	100%	1.00	2.00		2.00
						Total Costs	**25.80**
REVENUE				**Per ha**	**No of Has**	**Production Volume in Kg**	**Value**
Total production for Bitterball	Kg	0.30		352.50	0.15	52.88	15.86
Total production for Plantain	Kg	0.96		352.50	0.25	88.13	84.60
					0.4	(Total Ha)	
				Qty for the farm(Kgs)	**Has planted**		
Production of which for Bitterball							
66% is for home consumption	Kg	0.30	66%	34.90	0.10	10.47	3.14
34% is for sale	Kg	0.30	34%	17.98	0.05	5.39	1.62
Production of which for Plantain							
66% is for home consumption	Kg	0.96	66%	58.16	0.17	55.84	53.60
34% is for sale	Kg	0.96	34%	29.96	0.09	28.76	27.61
		Total Kgs for sale		47.94		**Income from Sales**	**29.23**
						Profit	**3.43**

B: Policy Analysis Matrix (PAM) for Bitterball and Plantain Production (Maryland) for 34% sale production

	Units	Quantities A	Quantities B	Market Prices	Conversion Factors	Social Prices	Market Values	Social Values	Transfers
REVENUE									
Bitterball Sales	Kg	5.39	1.00	0.30			1.62		
Import Parity	Kg	5.39	1.00	1.00	1.10	1.10		5.93	-4.31
Plantain Sales	Kg	28.76	1.00	0.96			27.61		
Import Parity	Kg	28.76	1.00	1.00	1.10	1.10		31.64	-4.03
						TOTAL REVENUE	**29.23**	**37.57**	**-4.31**
COSTS: Non-Tradable Inputs									
Labour	Labour	1.00	34%	20.00	1.00	20.000	6.80	6.80	0.00
Land rental	Ha	-	1.00	-	1.00	-	-	-	0.00
Marketing costs (transport)	Unit	1.00	100%	2.000	1.00	2.000	2.00	2.00	0.00
						TOTAL NON-TRADABLE COSTS	**8.80**	**8.80**	**0.00**
COSTS: Tradable Inputs									
Seeds inputs purchased (B and P)	Kg	10.00	0.34	5.00	1.10	5.50	17.00	18.70	-1.70
Fertlizer purchase (50kg bags)	Kg	-	1.00	0.00	1.10	0.00	-	-	0.00
						TOTAL TRADABLE COSTS	**17.00**	**18.70**	**-1.70**
						OVERALL TOTAL COSTS	**25.80**	**27.50**	**-1.70**
							PRIVATE	*SOCIAL*	
						Profit (REVENUE)	**3.43**	**10.07**	

INDICATORS	RATIOS	CALCULATIONS
Private Profits (USD/kg) (PP)	3.43	PP = (Private Revenue - Overall Costs @ market prices)
Social Profits (USD/kg) (SP)	10.07	SP = (Social Revenue - Overall Costs @ social prices)
Private Cost Ratio (PCR)	0.72	PRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices
Domestic Resource Cost Ratio (DRC)	**0.47**	DRC = (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices
Nominal Protection Coefficient (NPC)		
- On tradable Outputs	77.80%	NPC^{TO} = (Private Revenue @ market prices) / (Social Revenue @ social prices)
- On tradable Inputs	90.91%	NPC^{TI} = (Tradable Costs @ market prices) / (Tradable Costs @ social prices)
Effective Protection Coefficient (EPC)	64.81%	EPC = (Private Revenue - Tradable Costs @ market prices) / (Soc Rev - Trad Costs @ social prices)