I. INTRODUCTION

A. Background

1. **Liberia is emerging from two decades of conflict and political turmoil.** Under the leadership of President Ellen Johnson-Sirleaf, the Government of Liberia (GoL) seeks to rebuild the shattered economy, restore peace and security and improve the livelihoods of the 3.3 million inhabitants, many of whom were displaced by the conflict.[2] With the strong support of the international community, including the United Nations Mission in Liberia (UNMIL) as well as multilateral and bilateral partners, GoL is articulating its vision for sustained economic growth and poverty reduction.

2. **Agriculture continues to be at the centre of reconstruction and development efforts**. Agriculture was already recognized as central to peace-building and reconstruction efforts under the National Transitional Government of Liberia (NTGL) established at the cessation of the conflict in October 2003,[3] and featured in the Results-Focused Transitional Framework (RFTF).[4] Immediately after coming to office, President Johnson-Sirleaf's Government declared a '150 day action plan' that sought to deliver a 'democracy dividend' of immediate improvements in people's lives. Concurrently, in early 2006, GoL produced a Statement of Policy Intent for the Agricultural Sector and a short-term action plan for agricultural recovery, with support from the Food and Agriculture Organization (FAO). More recently, the Government produced an interim Poverty Reduction Strategy (iPRS) for the period July 2006– June2008 (Republic of Liberia, 2006a), which set out a comprehensive strategy for achieving the Millennium Development Goals (MDG).

3. The iPRS was based on four 'pillars' related to: (1) enhancing national security; (2) revitalizing the economy, (3) strengthening governance and the rule of law, and (4) rehabilitating infrastructure and improving delivery of basic services. The second pillar, in particular, focuses on improving the welfare of Liberians by raising incomes and improving food security through pro-poor economic growth that creates employment and provides opportunities for Liberians to participate in remunerative and sustainable livelihoods. This pillar sets out the nation's ambition to improve food security at national, community and household levels, thereby solidifying the important investments made to create a peaceful, secure and stable country.

4. As acknowledged in the iPRS, pillars (1), (3) and (4) are equally important to reducing poverty and hunger: the security focus of the first pillar is important for decreasing uncertainty and risk in communities, critical preconditions for investment; the emphasis on broad-based participation in governance and development is critical to the implementation of a pro-poor growth strategy; and key investments in public goods (infrastructure and services) contribute to the development of an enabling environment and sustainable livelihoods.

[2] The swearing-in of President Johnson-Sirleaf – Africa's first female President – took place in January 2006. Johnson-Sirleaf's Government replaced the National Transitional Government of Liberia (NTGL) that emerged from the Comprehensive Peace Agreement signed in Accra, Ghana in 2003.

[3] The NTGL took power in October 2003 and handed over power in January 2006 upon the swearing-in of President Ellen Sirleaf-Johnson.

[4] The RFTF emerged from the reconstruction conference held in New York in February 2004 as the mutually agreed framework for assistance in support of the NTGL. It identified nine 'clusters' of immediate priority, including the Restoration of Productive Capacity and Livelihoods (Cluster 7).

5. As a key vehicle through which the country can achieve the growth, equity and security objectives enumerated in the iPRS, GoL has identified, among others, the following overarching objectives for agricultural recovery and development in the country:

- Sustainable resettlement of all vulnerable groups (internally displaced persons, returnees and conflict-affected host communities); creation of employment for youth.
- Enhancement of food security and achievement of self-reliance in main staples, particularly an increased and stable supply and availability of food products, improvement of access to food for the most vulnerable social groups, and enhancement of the nutritional absorption capacity of the population.
- Increasing the income of smallholders through improved production, marketing and value addition, with emphasis on gender issues in agriculture.
- Rejuvenation of the vibrant 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 decentralization, economic management and food security.
- Increasing investment, both private and public, to jump-start the contribution of the sector to overall economic development.

6. Development partners (DPs) have pledged to support the iPRS and concur with the importance of agriculture and natural resources to continued economic growth and poverty reduction in Liberia. The joint Interim Strategy Note (ISN) of the World Bank[5] and the African Development Bank commits both agencies to fully support the iPRS with investments to support the development of the agricultural sector.

7. Despite the prominence given to agriculture, GoL and its DPs lack a solid analytical foundation upon which to base sound development strategies and focused interventions. In order fully to appreciate the role and contributions that the agriculture sector could make to meeting urgent and longer term expectations for recovery and development, and to provide the evidence base for policy development, the Ministry of Agriculture (MoA) embarked on a Comprehensive Sector Review. The objective was to enable the Ministry to determine how the sector could respond to meeting the key Government priorities of sustainable resettlement and reintegration, food security and nutrition, employment, incomes and foreign exchange reserves and investment, in order to meet the objectives of the iPRS, to jump-start the recovery of the economy and to enhance food security and development. Recognizing the enormity of the challenge in a country with very limited statistics and contemporary primary research, as well as severe capacity constraints, GoL sought the assistance of DPs in this task.

8. The Comprehensive Assessment of the Agricultural Sector of Liberia (CAAS-Lib) was jointly undertaken by FAO (with Norwegian funding from the Programme Co-operation Agreement with FAO), the World Bank and the International Fund for Agricultural Development (IFAD), to support to MoA and to assist in policy formulation and implementation. This Report is the outcome of that exercise.

[5] The World Bank's Country Re-engagement Note (CRN – World Bank, 2004a) emphasized five critical drivers of economic recovery, the first two of which relate to natural resource management (NRM): (1) the revival of agriculture and (2) sustainable management of remaining forests.

B. Objectives and Approach

9. **The overall objective of the Comprehensive Assessment is the establishment of an evidence base to enable appropriate strategic policy responses by GoL and DPs** in order to maximize the contribution of the agriculture sector to Government's overarching policy objectives. It is the first comprehensive agriculture sector review since the World Bank report of 1984 (World Bank, 1984). The main purpose of CAAS-Lib[6] is to assist the Government to:

- Carry out a comprehensive assessment of the agricultural sector and food security situation in the country. The exercise will generate appropriate information on the status, potential and constraints of the sector in order to facilitate decisions on the direction, methodology and scope of actions for the sector to contribute to the national priorities of food security and nutrition, productivity, investment, income and employment.
- Generate information for the formulation of an Agriculture and Food Security Strategy Framework in conjunction with the Poverty Reduction Strategy (PRS).
- Generate information to prepare a Comprehensive Policy for the agriculture sector.
- Determine the nature of and scope available to strengthen the capacities of the MoA at both the central and decentralized levels by conducting participatory diagnosis studies, planning and implementation of agricultural and food security policies and strategies.

10. **The approach adopted by CAAS-Lib involved rigorous qualitative and quantitative analyses combined with broad participation and consultations with stakeholders.** Sub-sector teams that involved local and international experts were tasked with producing individual background analyses (Box 1). This CAAS-Lib Synthesis Report is underpinned by the foundations described in the following paragraphs.

11. **Extensive historical perspective and literature review.** The war resulted in the destruction of all agricultural institutions (including their physical infrastructure as well as knowledge and data collections). However, Liberia had a wealth of agricultural institutions, a dynamic and diverse landscape of stakeholder initiatives and activities and many agricultural projects before the war. Much experience was obtained in these activities and it is essential that any post-war agricultural development and poverty alleviation programmes draw from that experience, avoiding past mistakes and using best practice learned from regional and international development.

12. **Assessment of the current situation.** Each sub-sector team assessed the current situation (strengths and weaknesses) relating to production, food security, and the programmes and activities being implemented. Project documents, activity and progress reports were the main sources of information, although attention was paid also to locally generated, informal community-based information. The objective was to obtain a description of and information base on the assessment by others of all relevant elements identified for assessment in CAAS-Lib, highlighting the main constraints and opportunities.

[6] CAAS-Lib constitutes an Agricultural Sector Review in World Bank parlance. Forestry is not covered because it has been comprehensively reviewed recently and policies have been formulated as part of the Liberia Forest Initiative.

Box 1: Subsector Teams in the Preparation of CAAS-Lib

Sub-sector	Responsibility	International Consultants	National Consultants
Coordination	Team Leader	Dr Dunstan S.C. Spencer	
	National Coordinator		Dr Othello Brandy
Macro-econ & General	Food Security	James Tefft (FAO) Mariam Sow	
	Gender	Ms Ruiz Abril	
Food Crops Production	Food Crops	Mr Paul Schoen	Mr Franklin Henries
	Mechanization & Post Harvest	Mr Lovell Thomas	
	Agric Marketing	Mr Chet Aeschliman (FAO)	
Livestock Production		Dr Zakary Rhissa (FAO)	Dr Kpadeh Koikoi
Fisheries Production		Mr Ousman Drammeh	Mr Yevewno Subah
Land and Water Resources	Land & Water	Dr Sampson Agodzo	Mr Patrick Farnga
	Land Tenure	Jon D. Unruh	
Tree Crops	Tree Crops	Dr Michael D. Wilcox	
Rural Finance		Mr Chet Aeschliman (FAO)	Mr Alphonso Wesseh
Institutions	Govt	Dr Peter Smith	Mr Jallah Kennedy
	CBOs & NGOs		Mr James Kiazulu
	Agric Extension	Mr Michael Connolly	Mr Paul Jallah
	Agric Research	Dr Ponniah Anandajayasekeram (IFPRI)	Mr Jallah Kennedy
	Agric Education		Dr Othello Brandy

13. **Gap-filling by participatory rapid rural appraisals (PRRA).** As part of the assessment of the current situation, and in order to collect all the information needed for all the analyses, including value chain and comparative advantage analyses, quantitative and qualitative data were collected from:

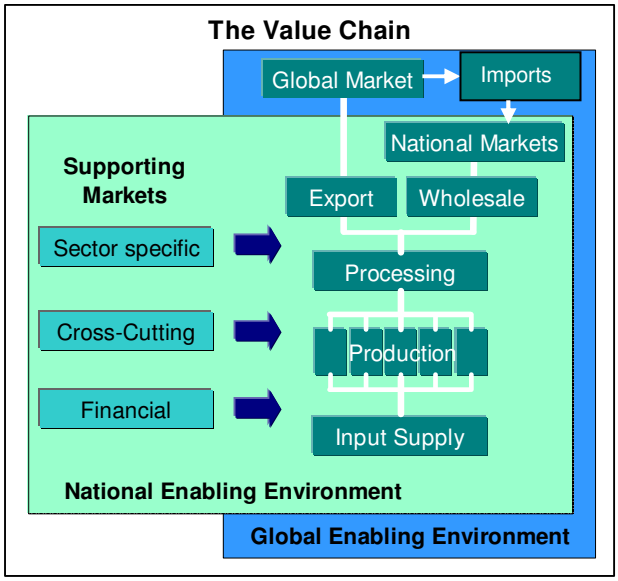
- Key informants: face to face interviews with knowledgeable persons in Monrovia as well as in the different rural locations.
- Focus groups: face to face interviews with carefully selected and representative groups concerned with different agricultural activities, taking into consideration the diverse categories of people engaged in the agro-based and rural sector, with the necessary gender balance and including the most vulnerable.
- Individual respondents: questionnaire interviews with carefully selected and representative individuals.

14. **Value chain and comparative advantage analyses.** A value chain lens (Box 2) was used to analyse targeted sub-sector markets (food crops, plantation crops, livestock, and fisheries). 'Vertical' analysis was complemented by a review of 'horizontal' aspects (research, extension, infrastructure, and institutional framework, including the role of the public sector and its decentralized performance). The study also estimated the comparative advantage of production of major agricultural commodities in Liberia within the limitations of data and information, in order to identify those products with economic potential.

Box 2: Value Chain Methodology

A value chain is the set of market actors in the flow of a particular product (or service) from the raw material stages through production, processing and distribution and on to an end market. The application of a value chain lens is meant to ascertain the context for the market actors and includes:

- The vertical linkages or relationships between market actors (rural households, private sector processing and marketing firms, etc); how enterprises buy and sell from one another.
- The horizontal linkages or relationships and linkages between market actors engaged in a similar activity (e.g. rice farming, coffee processing, exporting, etc.) and how they collaborate and create partnerships with one another (professional associations, farmer groups, civil society, research, extension, infrastructure, and the institutional and organizational environment, including the role of the public sector, private sector, and decentralized formal and informal stakeholders).
- The process of generation and distribution of Value Added (VA) along the chain and across actors;
- The supporting markets for products or services that benefit members of the value chain (e.g. financial and transportation services and equipment and input suppliers).
- Growth opportunities (domestic and international demand/supply projections and perspectives including improving the competitiveness of domestic supply).
- The enabling environment, which comprises the policy, regulatory and governance environments, and includes existing resources and capacities, that governs all the market actors in the value chain, at the national and/or the international level.



15. **Inception, capacity building and training.** An inception workshop was held in June 2006, presided over by the Honourable Minister of Agriculture with full participation by FAO, the World Bank and all stakeholders, to discuss the objectives, process and expected outputs of CAAS-Lib. A training workshop was held in Monrovia to launch the fieldwork for CAAS-Lib. The Team Leader, the national Coordinator and International Consultants provided theoretical and practical training to national consultants and other sub-sector team members. Topics covered included value chain and comparative advantage analysis and

participatory field data collection techniques, including key informant, focus group and questionnaire surveys. The lead experts provided training in issues specific to each sub-sector. On-the-job training was also provided by the lead experts to each sub-sector team throughout the data collection, analysis and report writing stages of the project.

16. **Priority policy and institutional measures and investment plans.** Using the findings from the sub-sector studies, policy options, policy interventions, institutional change (particularly with respect to the role of the government, and public support for agriculture, decentralization and civil society engagement) and investment were specified. The potential contribution of selected commodities and services to the achievement of sustainable food security and nutrition, income, and employment was assessed. The output was expected to be policy relevant but not policy prescriptive.

17. **Consensus building and ownership.** Throughout the implementation of CAAS-Lib particular attention was paid to consensus building and ownership of the whole process in order to capture the vision of agricultural development held by policy makers, their constituencies at all levels, and the local and international development community. Efforts were made to mobilize institutions, and partnerships were forged at different levels (e.g. State, County, Clan and community) as appropriate and feasible. The aim was to ensure local ownership, to build consensus and to lay the foundation for broad local participation in the decentralized design and implementation of any agricultural development programmes resulting from CAAS-Lib. Policy dialogue, validation workshops and peer reviews were used to enhance consensus building and ownership.

18. **Policy dialogue and strategic direction.** The CAAS-Lib team, especially the Team Leader and National Coordinator, engaged in policy dialogues with all the partners involved in the agricultural sector. Special attention was paid to the private sector and other civil society actors, to inform them of the draft findings and proposals and to determine their expectations and the nature and extent of their likely involvement in implementing the proposed strategy. A Steering Committee, consisting of representatives of major stakeholders in agricultural development in Liberia (see Annex 1) was formed to provide overall policy guidance to CAAS-Lib.[7]

19. **Validation workshops and peer review.** Once the draft findings of sub-sector reviews emerged they were presented and discussed with key stakeholders at two regional validation workshops, held in Ganta, Nimba County on 22–23 February 2007 and in Harper, Maryland County on 26–27 February 2007. Over 120 participants representing farmers' organizations, County Administrations, local and headquarters staff of the Ministry of Agriculture and other Ministries, research organizations, NGOs and donor organizations attended the workshops. Comments received from participants were used to revise sub-sector reports and to guide the preparation of the Synthesis Report. The draft Synthesis Report was presented and discussed at a National Validation Workshop held in Monrovia on 28–29 May 2007. A group of individuals with expertise in agricultural sector reviews and African agricultural development, with broad-based representation from relevant institutions and partners within and outside Africa, were selected jointly by the MoA, FAO and the World

[7] As provided in the Project document of FAO and approved by the Government.The Steering Committee held its inaugural meeting under the Chairmanship of the Honourable Minister of Agriculture Dr J Chris Toe on Thursday June 15 2006, during which the Terms of Reference (ToR) for the Committee were approved and adopted. ToR for the sub-sector studies and the work plan and draft methodology for CAAS-Lib were also reviewed. Other meetings were held in February 2007.

Bank to review the draft CAAS-Lib Synthesis Report and provide comments to the study team.[8]

20. As one would expect in a country emerging from war, there is generally a dearth of data; in some instances, multiple but inconsistent sources are available. To provide an evidence base for this analysis, preparation of a number of the Background Reports involved primary data collection. In addition, a number of existing statistical sources were utilized, particularly existing household surveys (Box 3). To ensure consistency, a strict order of priority was imposed on competing macroeconomic analyses, with official data as reported by the International Monetary Fund (IMF) as the preferred source (this provided data from the late 1990s). Earlier macroeconomic data were reported in various World Bank reports from the 1970s and early 1980s. There are no data for the periods of intense conflict; however, the GoL did publish some macroeconomic statistics in the late 1980s as reported by UNDP (2001).

Box 3: Household Survey Data used in CAAS-Lib

The Liberia **Comprehensive Food Security and Nutrition Survey** (CFSNS) was conducted in March and April 2006 and collected information at the household, individual and community level. The household questionnaire was based on a two-stage sampling procedure applied at each stratum – in this case each County. Twnty-five communities per County were randomly selected (communities with fewer than 10 or more than 1,500 structures were excluded), with 12–14 households randomly selected within each community. Nationally 5,409 households were surveyed. In the absence of recent census data, the sampling frame took advantage of the village mapping exercise coordinated by the Humanitarian Information Centre in 2005. This was complemented by key informant interviews at the community level, which involved three men and three women.

The **Poverty Profile of Liberia** was conducted by UNDP in 2001 and used data from the 1986 and 1999 Demographic and Health Surveys (DHS) as well as an updated survey instrument. Of the 579 enumeration areas (EAs) that formed the sampling frame of the 1999 DHS, a random sample of 194 was selected. Within each of these selected EAs, a further random sample of DHS respondents was then selected for interview. In total 1,836 households were interviewed – at least 30 in each County.

C. Outline of the Report

21. The findings of CAAS-Lib are contained in two volumes: the Synthesis Report comprises Volume I while the Working Papers prepared for each of the sub-sectors and thematic areas reviewed are contained in Volume II. The Synthesis Report (Volume I) consists of five chapters. Following the Introduction, Chapter Two provides a brief analysis of the state of the Liberian economy indicating the sectoral shares and emphasizing the role of agriculture, the level of poverty, and actions taken by the new government to launch the process of economic recovery. Chapter Three describes the foundations of agriculture; it highlights the status of the natural resource base for agriculture and the production of crops, fish and livestock products, focusing on the constraints on and opportunities provided for agricultural development. The following chapter reviews key institutional issues, including those for input and output marketing and trade, financial intermediation, research, extension and rural education. Finally Chapter Five summarizes the key development challenges,

[8] The World Bank Concept Note for CAAS-Lib was peer reviewed by a team consisting of Derek Byerlee, Senior Adviser, DECWD, Eduardo L. Leao de Sousa, Senior Economist, AFTS1 (both World Bank) and Michael Marx, Senior Rural Finance Expert, TCIW, Carlos Santana, Senior Policy Officer, TCAS and Mark Smulders, ESA (all FAO).

discusses development options and presents preliminary investment projects for an agricultural development strategy for Liberia.

II. THE LIBERIAN STATE AND ECONOMY

D. Historical Perspective

22. **Africa's oldest independent republic lost its way and descended into civil war.** Liberia, sovereign for over 158 years, is Africa's oldest independent republic. Founded by slaves freed from the Americas in 1822, Liberia declared its independence in 1847. In the years that followed, the initial settlers – Americo-Liberians – came to dominate the political process and the government at the expense of various indigenous groups. Tensions between these 'elite' and indigenous peoples festered, encouraged by the deeply dualistic nature of the economy. In 1980 the government was overthrown by a *coup d'état* by indigenous military leaders led by Samuel Doe. Doe's government became well known for rampant corruption, brutality, and human rights abuses. In response, the National Patriotic Front of Liberia (NPFL), led by Charles Taylor, launched a revolution against President Doe in 1989, which eventually led to the overthrow of the government in 1990. Instead of restoring order, the rebellion by the NPFL ignited a fourteen-year civil war that ended fully only in August 2003, when the international community brokered a comprehensive peace agreement (CPA) with the warring parties. The CPA paved the way towards the establishment of the United Nations Mission in Liberia (UNMIL) and a two-year National Transitional Government (NTGL). Subsequently, presidential and legislative elections held in October and November 2005 led to President Ellen Johnson-Sirleaf becoming Africa's first democratically elected female Head of State.

23. **Liberia developed a dualistic economic structure and stark inequalities between the formal and informal sectors.** The growth rates of the GDP in the 1950s and 1960s averaged 9% per annum (p.a.), but these were driven by the formal economy and particularly the 'enclave sectors' of iron ore, timber and rubber.[9] By the end of the 1960s, these sub-sectors accounted for 38% of monetized GDP and 90% of exports – estimates of 'non-monetized' GDP amounted to 8% of the national economy.[10] The 70% of Liberians in the 'non-monetized' sector, mainly subsistence farmers, survived on per capita incomes of US$50, compared with a national average of US$270.[11] Various analyses of the economic prospects of the 1970s and 1980s highlighted the economic benefits that would accrue from a more integrated Liberian economy. The persistence of this dualistic structure has been identified as a major contributing factor to the subsequent conflict.[12]

24. **The impact of the civil war and poor governance has been devastating for Liberia's economic development.** Prior to the war, aggregate economic performance was impressive. Between 1955 and 1965, foreign investment increased from US$60 million to US$500 million, three-fifths of which was invested in the mining sector. The 1970s heralded a new era of low growth: by the first half of 1970, annual GDP growth fell to 1% and was

[9] Various terms have been used to describe that part of the economy associated with informal/subsistence activities. For instance, Dalton *et al* (1965), split the agriculture sector into three categories: large-scale commercial, subsistence and 'peasant money'. The World Bank (1971) differentiates between the monetary and subsistence sectors.

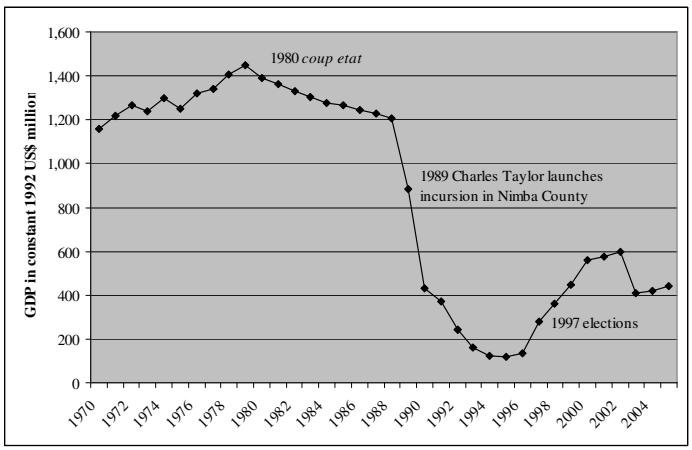
[10] In fact, iron ore dominated, with figures of 32% and 70%, respectively.

[11] World Bank (1971).

[12] Richards P. (nd); Richards P, Archibald S, Bruce B, Modad W, Mulbah E, Varpilah T, Vincent J (2004).

negative by mid-decade. The *coup* of 1980 initiated a sustained period of economic decline in which GDP dropped precipitously from over US$1.14 billion in 1987 to a mere US$260 million in 1997. Despite a slight recovery early this century, GDP today remains less than half of that in the 1970s (Figure 1).

Figure 1: Trend in Real GDP 1970–2005



Source: World Development Indicators.

25. **With the decline of other economic sectors, agriculture has grown in importance.** The mining sector collapsed from 11% of GDP in 1988 to less than 1% in 2003. Over the same period, the tertiary (service) sector dropped from just under half to about a quarter. The forestry sector peaked during the worst excesses of illegal logging around 2000, but has since declined with the ban on timber exports (now rescinded). Manufacturing currently accounts for around 12% of GDP. Consequently, the agricultural sector currently accounts for over half of GDP, compared with around 10% in the 1970s and early 1980s (Table 1).

Table 1: Sector Composition of GDP (percentages)

	1978	1979	1980		1987	1988	1989		2003	2004	2005
Agriculture and fisheries	11%	10%	11%		33%	28%	34%		46%	52%	52%
Rubber	6%	5%	6%		7%	5%	7%		11%	20%	21%
Coffee and cocoa	-/-	-/-	-/-		1%	1%	1%		0%	0%	0%
Rice	0%	0%	0%		10%	9%	10%		6%	5%	6%
Cassava	0%	0%	0%		5%	4%	5%		10%	8%	8%
Other	5%	5%	5%		11%	9%	11%		19%	18%	17%
Forestry	6%	6%	6%		5%	5%	5%		22%	12%	12%
Logs and timber	0%	0%	0%		3%	3%	3%		9%	0%	0%
Charcoal and wood	0%	0%	0%		2%	2%	2%		13%	12%	11%
Mining and panning	25%	26%	30%		11%	8%	11%		0%	0%	0%
Manufacturing	8%	9%	7%		8%	8%	7%		7%	12%	12%
Services	50%	49%	45%		46%	46%	47%		26%	24%	24%
Transport and communication	12%	11%	10%		-/-	-/-	-/-		7%	7%	7%
Government services	10%	10%	11%		-/-	-/-	-/-		3%	3%	3%

Source: World Bank (1982), UNDP (2001) and IMF (various years).

26. **The collapse of the domestic economy led to a significant deterioration in the trade balance and the country now faces a significant current account deficit.** Structural dependence on food and machinery imports, compounded by a rapid increase in fuel imports and combined with the collapse of the export sector, turned a positive trade balance of over

US$100 million in the mid-1970s to a deficit of over US$160 million in 2004 and 2005 (Table 2). This significant negative trade balance is an important factor in Liberia's unsustainable debt position.

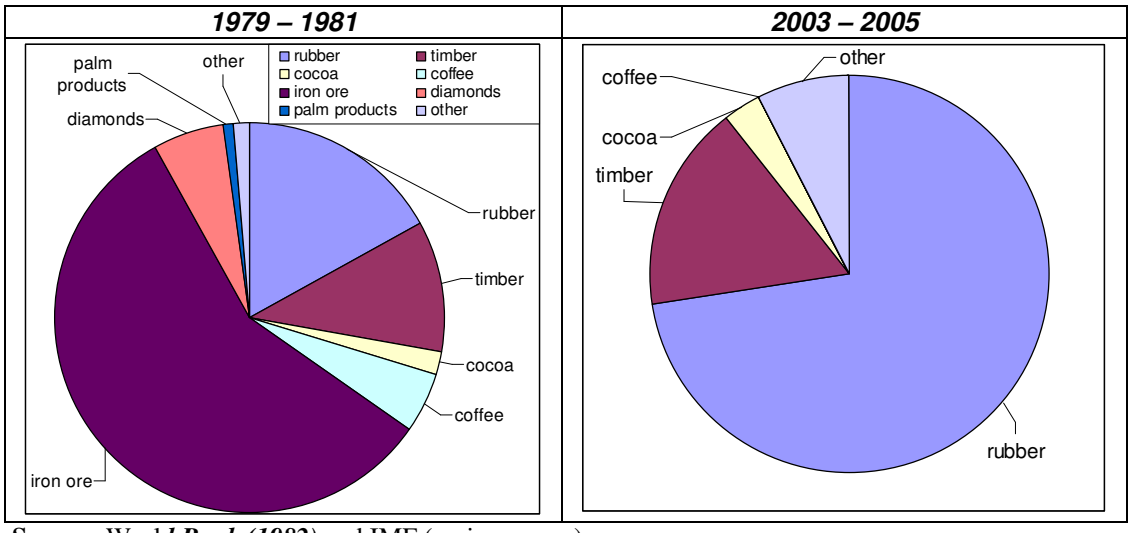
Table 2: Imports and Exports for 1979–2005 (US$ million)

	1979	1980	1981		1987	1988	1989		2003	2004	2005
Total exports	526.0	574.8	521.0		383.3	396.3	460.7		109.0	103.9	112.2
Total imports	506.5	533.8	478.4		307.6	272.3	247.8		140.2	268.1	273.6
Trade balance	19.5	41.0	42.6		75.7	124.0	212.9		-31.2	-164.2	-161.4

Source: World Bank (1982), UNDP (2001) and IMF (various years).

27. **External trade is now dominated by cash crops with the collapse of the other 'enclave' export-oriented industries.** Historically, exports of rubber, timber and gold, and iron-ore and diamond mining, underpinned the Liberian economy. Official trade statistics report current exports at around one-fifth of their levels prior to the political upheaval and a shifting pattern of trade driven by the collapse in the mining sector (Figure 2). According to IMF statistics, rubber now accounts for 90% of exports. Additional foreign exchange is derived from Liberia's shipping registry as well as significant foreign assistance.

Figure 2: Composition of Exports 1979–2005



Source: World *Bank (1982)* and IMF (various years)

28. **The collapse of government has mirrored the decline in the economy** caused by low domestic revenue collection (because of a depressed revenue base as well as inefficient collection), extremely weak institutional capacity and severe inefficiencies in public financial management – including widespread corruption during the NTGL period. Revenue collection amounted to between one-fifth and one-quarter of national GDP in the 1970s but has fallen to around 13% currently – this ratio underestimates the absolute decline, given that GDP is at one-third of the pre-war level. According to IMF figures, tax revenue amounted to US$72.6 million in 2005, with the largest shares coming from direct taxes (40%) and taxes on international trade (40%). Receipts from the Liberian International Shipping and Corporate Registry have fallen by half (as a share and in absolute terms) over the last five years and now account for 12% of revenue. Taxes on goods and services remain extremely low at around US$5 million per year.

29. Commensurate with the collapse in receipts, aggregate public expenditure is extremely limited, with the national budget in 2006 projected at US$130 million (less than US$40 per person), a 60% increase over the previous year. At least 15% of expenditure is targeted to pro-poor activities. Historically, however, recurrent expenditure dominates, with around 85-90% of the budget (with wages and salaries taking over half). Capital expenditure has fallen from over US$30 million in 2000–01 to less than US$10 million currently (nominal terms) as GoL has sought to improve conditions for civil servants. Expenditure on social services has not exceeded 10% of actual revenue since 1997. The majority of activities in the areas of health, education and water and sanitation are donor funded.

30. **Government financing of agriculture has been traditionally modest, in spite of its important contribution to GDP.** The national budget allocation to MoA over the period 1997–2002 never exceeded 1%. While some expenditures through other ministries and agencies, such as the Ministry of Rural development (MORD) and the Ministry of Internal Affairs (MIA), also contribute to rural development, the portion of the national budget dedicated to agricultural activities by these ministries was insignificant.

31. **The years of mismanagement have left Liberia with a huge external debt burden** (both principal and interest are in arrears), estimated at about US$3.7 billion as of mid-2005. Ninety percent of the outstanding debt is external, equivalent to an astonishing 800% of GDP and 3,000% of exports. By comparison, the threshold for debt relief under international arrangements is a debt-to-exports ratio of 250%. Domestic debt and non-salary arrears are estimated at about US$700 million, a significant part of which is owed to the banking system (including the Central Bank of Liberia).

E. Livelihood and Well-being of Liberia's Rural Population

32. **After more than 14 years of civil war and political instability, Liberia faces huge development challenges**. Most Liberians remain poor (see below), but quantifying current needs is made harder by lack of contemporary information on households, communities and the population in general. The last official census was carried out in 1984; based on projections of 2.4% annual growth the current population is around 3.023 million. However, official estimates frequently differ from estimates obtained by other means, such as voter registration for the 2005 elections and national immunization days.

33. **Uncertainty over the aggregate population is exacerbated at the County level because of large-scale displacement during the war years.** Half of Liberia's population lives in and around Monrovia. According to the CFSNS, the average household was displaced twice during the war – only 14% of households report never having been displaced – although this varied across counties according to the intensity of the fighting. By the end of 2003 most households had returned, and in most areas fewer than 8% of households remain displaced.

34. The national average household consists of 5.6 persons, with the largest household sizes in the two most populated counties, Montserrado (6.4 persons per household), and Nimba and Grand Gedeh (6.1 persons per household). Grand Cape Mount and Grand Bassa Counties have the smallest average household sizes (4.6 and 4.8 persons, respectively). The proportion of female-headed households varies from 5% in Bomi to 21% in Lofa (the County that was most continuously and most heavily affected by incursions and looting during the civil conflict) with a national average of 13%. The overall mean age of household heads is

40 years, with 8% of households headed by members 60 years of age or older. Overall, the dependency ratio is 1.4 for all households, ranging from 1.2 in Gbarpolu to 1.6 in Grand Kru, where families in general have more children.

35. **The majority of Liberians have always been poor – a product of the dualistic economy, noted above – but their situation has deteriorated since the war.** Between 1997 and 2001 the proportion of people living on less than US$1 a day increased from 55% (UNCCA, 1997/98) to 76% (UNDP, 2001). The level of extreme poverty has increased over the same period from 14% to 52%, with more than 1.4 million people living in abject poverty on less than US$0.50 per person a day. A typical household spends more than two-thirds of its income on providing food for the family, leaving little for basic investments, education, health care and leisure.

36. **Poverty is pervasive, but rural households are worse off.** More than half of the people in Liberia (56%) live in rural areas, defined as settlements with fewer than 2,000 inhabitants, and 86.3% of the rural households are poor, with 64% living in severe poverty (UNDP, 2001). Rural areas generally have no electricity or piped water and lack quality housing, toilets and sewerage systems. In concession towns, many of which are now devoid of functional industries (such as Bong Mines and Yekepa), 86% of households fell below the poverty line and 60% lived in severe poverty. Social infrastructure and amenities have collapsed and employment opportunities are scarce. Even in the few remaining functional concessions, such as the Firestone Rubber Plantation and the Liberia Agriculture Company, many people still live on less than US$1 a day. In County headquarters, whose populations expanded rapidly during the war years, 75% of households remain poor, with 40% in severe poverty. Services, including electricity, sanitation facilities and piped water, have generally ceased to operate. Monrovia is the only functioning city in Liberia in which some social amenities remain after the civil war. Just over half the households surveyed (51%) fell below the poverty line and 22% lived in severe poverty. Monrovians are, therefore, comparatively better off than other Liberians.

37. **Liberia is one of few countries in which the poverty rate of female-headed households is lower than male-headed households**. According to UNDP (2001), the proportion below the poverty line was 79% for male-headed households compared with 68% for female-headed households (respective figures for severe poverty were 55% and 42%). One reason for this is that female heads of households work in the informal non-farm sector where incomes are relatively high, as well as receiving inheritance from husbands and close relatives, and higher levels of education. It is important to note that these expenditure statistics do not include non-monetary dimensions, and here women tend to fare worse: women are particularly vulnerable as a result of exclusion, marginalization and gender-based violence.

38. **Non-economic dimensions of poverty in Liberia are also important** and include ‘capacity’ and ‘participation’ poverty (UNDP, 2006). With the total collapse of the education system, most young Liberians lack basic knowledge, skills and resourcefulness. This ‘capacity poverty’ makes it difficult for them to set and achieve goals, budget and use scarce resources for agreed purposes, or think through and manage complex processes and interactions. Capacity poverty also excludes them from taking advantage of the limited domestic and international employment opportunities that are available. As in most African countries, a deficiency in capacity at home co-exists with a large emigrant population who are working in overseas markets due to poor domestic incentive structures and the attraction

of the international employment market. The legacy of a dualistic society lingers in 'participation' poverty, in which the vast majority of the population are unable to realize their rights to be a part of decision-making processes. Their voices are not heard when policy objectives are being established and decisions are being made. Besides the lack of institutional and human capacity to foster participation, poor governance practices have deprived many Liberians from participating in the nation's development process.

39. **Income-generating opportunities are limited as a result of the conflict, a narrow economic base, disruption in local farming and trading systems, loss of personal assets and a breakdown in social capital.** These limitations have contributed substantially to income poverty and impaired human development. It is widely reported that the unemployment rate in Liberia is 85% – of course, this reflects the paucity of employment opportunities in the formal sector. Farming, fishing and other natural-resource (NR) based livelihood strategies are essential to survival and are associated with lower per capita expenditure (Table 3).

Table 3: Livelihood Profiles and the Composition of Income; 2006

Per capita expenditure US$/ month	Livelihood profile		Source of income					
		% of HH	Main income	%	Second income	%	Third income	%
17.75	petty trader	12%	petty trade	81%	food crop production	5%	contract work	4%
17.52	employee	5%	salary from employer	75%	petty trade	12%	food crop production	8%
14.68	contract labourer	10%	contract work	79%	petty trade	6%	food crop production	5%
14.66	charcoal producer	7%	charcoal/firewood production	72%	food crop production	8%	petty trade	5%
14.42	fisheries worker	4%	fishing	79%	petty trade	6%	food crop production	8%
13.75	rubber tapper	7%	rubber tapping	75%	petty trade	6%	food crop production	5%
13.64	skilled labourer	3%	skilled labour	74%	petty trade	8%	food crop production	7%
13.11	hunter	5%	hunting/trapping	73%	food crop production	8%	processing palm oil	4%
11.84	food crop farmer	15%	food crop production	74%	petty trade	6%	fishing	4%
11.80	cash and food crop producer	6%	cash crop production	62%	food crop production	22%	processing palm oil	5%
11.20	palm oil sellers/ producer	14%	processing palm oil	84%	contract work	5%	petty trade	3%
11.00	palm oil and food crop processors	8%	processing palm oil	49%	food crop production	26%	cash crop production	5%
	other	3%	other activity	82%	petty trade	6%	food crop production	2%

Source: CFSNS (2006).

40. **Food crop production is the most important source of livelihood** (41% of households are engaged in this activity). Other economic practices include processing and sale of palm nuts and oil (31%) as well as petty trade and small-scale business (28%), and contract or casual work (18%). The relative importance of these income sources differs across Liberia: for instance, the contribution of food crop production is particularly high in the south-eastern counties of Sinoe (35%), Maryland (29%) and River Gee (26%). Cash-crop production is predominant in Nimba (15%) and Grand Bassa (10%). Processing and selling of palm nuts is a key source of income and also serves as a coping strategy across Liberia (as evidenced by the low expenditure figures of households that depend on this activity – see Table 3) but is particularly high in Lofa (37%), River Cess (33%) and Bomi (27%).

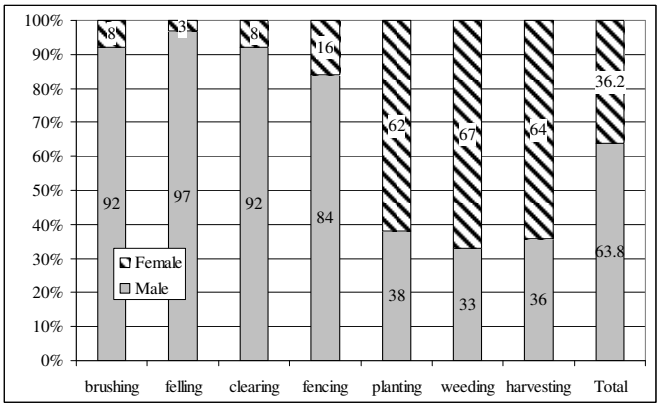
41. **Access to natural resources is important for coastal and forested areas.** Income from fishing contributes to 22% of the household income in Grand Kru and 14% in Grand Cape Mount, while trapping and hunting dominates in Grand Gedeh (25%), River Cess (25%), Gbarpolu (17%) and Sinoe (15%). Those areas with large rubber plantations exhibit a

dependence on tapping: Margibi (22%), Bomi (15%) and Maryland (13%). Selling of charcoal and firewood dominates in Margibi (19%), Bomi (18%) and Montserrado, due to their proximity to urban households that depend on purchased charcoal as fuel. Montserrado also shows the highest contributions from petty trade/small-scale business (23%) and salaries from full-time employment (11%). Finally, contract work is one of the major income sources in Lofa (19%) and Grand Cape Mount (15%).

42. **Men and women have clearly defined economic roles.** CFSNS data show that, on average, 33% of the household income was jointly generated by men and women, 33% by men only and 16% by women only. An additional 5% was generated by women with the support of children, and 10% jointly by all household members. Six percent of food crops are produced only by men compared with 8% produced only by women and 57% produced jointly by women and men. By contrast, 22% of cash-crop income was produced by men only and only 5% by women working alone. Women and men jointly produced 49% of the cash income. Fishing income also shows gender differences, with women dominating inland fishing while men dominate marine fishing. Men were much more likely than women to engage in rubber tapping, pit-sawing, mining, salaried work, skilled labour, handicraft work, contract or casual work, and raising livestock for others. Women more commonly engaged in petty trade and small-scale business, begging, and sales of prepared food. As mentioned above, children alone were not commonly reported to contribute to the household income; however, boys contributed to the 4% of income generated by the selling of firewood and mining, while girls contributed to the 3% of income generated through begging and assistance from relatives and remittances.

43. **As is common in most traditional farming systems in Sub-Saharan Africa (SSA), men and women share the tasks of staple food crop production.** In Liberia, it is estimated that women contribute 36% of the total labour in rice and cassava production and men contribute 64%. Men provide most of the labour for clearing and preparing the land, while women do most of the weeding and harvesting of the crop (Figure 3). The traditional division of labour in agriculture constrains women's access to land: men are responsible for clearing and felling the land at the beginning of the agricultural cycle, tasks which are carried out in groups through communal arrangements (kuu), and the inability of female-headed households to contribute labour to the kuu sometimes restricts their ability to farm. This is sometimes used by community leaders as a reason for not granting such households access to land.

Figure 3: Gender Division of Labour in Food Crop Production



Source: MoA (2001). Data relate to rice and cassava production.

44. **Food security profiles developed by CFSNS showed that most rural households are food insecure.**[13] Food security exists when all people at all times have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2006). Nationally, 80% of the rural population was either moderately vulnerable (41%) or highly vulnerable (40%) to food insecurity, while only 9% of the rural population was food secure, and 11% were food insecure. At the same time, chronic malnutrition rates reached 39% for children under five, only 32% of households had access to improved water sources, and other basic services were also limited. As illustrated in Table 4, different livelihood profiles provide various degrees of food security, with the most food insecure and highly vulnerable groups involved in palm oil production and selling (64%), followed by hunters and contract labourers (respectively 61% and 58%). The more food secure and moderately vulnerable groups are among the cash and food crop producers (37%), the petty traders and the employees (44% each).

Table 4: Vulnerability, Income and Livelihood Profile in Liberia

Livelihood profile*	% moderately vulnerable and food secure	% highly vulnerable and food insecure	% of income derived from food crop production	% of income derived from cash crop production
Cash and food crop producers	63	37	62	22
Petty traders	56	44	5	0
Employees	55	44	4	0
Food crop farmers	53	49	74	0
Charcoal producers	53	47	8	0
Rubber tapers	53	47	5	0
Fisher folks	52	48	8	0
Palm oil and food crop producers	52	48	26	5
Skilled labourers	49	51	7	0
Contract labourers	42	58	5	0
Hunters	40	61	8	0
Palm oil producer/ seller	36	64	0	0

Source: CFSNS (2006). Notes: * definitions consistent with Table 3.

45. **Rates of chronic malnutrition before the war were already as high as in 2006, indicating that this is a long standing problem in Liberia.** This may explain why there is a weak correlation between food security and the malnutrition status of the Liberian population. High food insecurity and an above-average prevalence of stunting are observed in six of the fifteen counties, suggesting that both are consequences of broader deprivation. Other counties with high insecurity exhibit a lower prevalence of stunting: this is hypothesized to be a consequence of internally displaced persons (IDPs) who have returned from relatively better conditions in camps. While the stunting rate may not be deteriorating in the short term, rates of wasting (which are around 6% on average) may worsen if improvements in access to basic services are not achieved in the coming years. The implications of high rates of chronic malnutrition are serious and far-reaching. A significant

[13] Household food security profiles were developed by combining the results of a two-step analysis: The first involved an assessment of food consumption frequency and dietary diversity as proxies of access and nutritional intake, while the second assessed the household's potential to access sufficient food through purchasing power or their own production.

body of research has shown how malnutrition "prevents poor people from escaping poverty because it diminishes their ability to learn, work and care for themselves and their family members. Hunger sets in motion an array of outcomes that perpetuates malnutrition, reduces the ability of adults to work and give birth to healthy children, and erodes children's ability to learn and lead productive, healthy and happy lives" (IFPRI 2004). The prevalence of malnutrition has been shown to be higher where households are involved in subsistence farming (IFPRI 2004); this is an additional reason why Liberia needs development of smallholder agriculture.

F. The Government's Efforts to Support Economic Recovery

46. **The Government of Liberia is cognizant of the fact that peace and stability are decisive conditions for growth and improved livelihoods in Liberia**. The GoL and DPs have invested extensively in actions to preserve peace and promote stability. While security will continue to be a main preoccupation of the Government's post-conflict efforts to build confidence, particularly in the rural areas, revitalizing the productive sectors, especially agriculture, to improve the availability of food and generate income is critical for the long-term social stability and welfare of the Liberian population.

47. The current Government has worked to regain the trust of Liberians and the international community through sound and transparent macroeconomic management (i.e. the Governance and Economic Management Assistance Programme, GEMAP). These measures have contributed to satisfying the critical preconditions for debt relief and lay the groundwork for restoring investor confidence. Coherent and stable fiscal, monetary and exchange rate policies are critical preconditions to establishing a viable food and agriculture sector, developing sustainable livelihoods and improving food security. This macroeconomic policy framework has an important influence on sector performance through the incentives offered to economic actors and its effect on terms of trade and the competitive position of African economies.

48. **Liberia suffers from significant levels of corruption, a malaise typically associated with natural resource dependence** (an element of the 'resource curse') and a cause and effect of past socio-political arrangements. As the iPRS notes, corrupt behaviour is widely expected: "any government official who fails to acquire wealth during his or her tenure is considered foolish" (although this does not imply that corruption is confined to the public sector). Breaking this acceptance is at the forefront of GoL's prevailing 'zero tolerance' approach to tackling corruption, while systems improvements are at the core of the GEMAP programme. A total of 96 major contracts and concessions agreements have been reviewed by the current government and some (notably the Mittal Steel iron ore concession) have been renegotiated on terms more favourable to Liberia. A similar approach is being adopted for agricultural concessions: the Firestone concession, which was renewed under the NTGL, is currently being renegotiated. As the term of the Government Reform Commission comes to an end, the GoL is in the process of establishing *inter alia* an Anti-Corruption Commission to carry forward this agenda.

49. **Reduced scope for and public tolerance of corruption in the agricultural sector requires action on three fronts**: (1) continued improvements in public financial management, and public sector reform (the recent removal of ghost workers is a major step forward in this regard); (2) special efforts to reform agricultural parastatals that have traditionally been a major source of rent-seeking and corruption; (3) transparency in the

management of natural assets, in particular agricultural concessions in the rubber and oil palm sectors, for instance by development of a concession policy and a model concession contract that serves as a template for individual agreements.

50. **Ensuring adequate availability and access to food in the short run remains a priority until households complete their transition from an emergency footing to sustainable livelihoods.** Instruments used to ensure food security during the current recovery period include: the distribution of a variety of food and non-food commodities, food for work, school feeding, training programmes, infrastructure rehabilitation and the provision of seeds and tools to Liberians returning to their communities. Targeted, short-term assistance will be required for acutely malnourished children, young unmarried mothers and the elderly. It is also clear, however, that given the large numbers of vulnerable Liberians, the country needs to focus its attention on – and accelerate investments in – medium-term development. In essence, this implies that short-term aid should not come at the expense of establishing the food system (Pingali *et al*., 2005).

51. The vision of the Government is the holistic development of agriculture, forestry and fisheries with special focus on the transformation of smallholder agriculture into a sustainable, diversified, income-generating, modernized and competitive sector well integrated into the domestic and international markets (MoA, 2006). The vision also encompasses a vibrant commercial agriculture sector that provides support and incentives to smallholder agriculture.

52. GoL's strategy to achieve its key objectives in the agriculture sector will be governed by the following principles:

- Broad population and geographical coverage of the measures and policies, with special focus on smallholders and areas and populations not previously supported.
- Priority accorded to measures and policies that have immediate impacts on production, food security and local commerce.
- Participatory processes with stakeholder involvement at all stages of the policy decision-making process, as well as in the management of natural resources and taking into account local knowledge.
- Gender- and youth-sensitive development, particularly empowering women and creating incentives for youth (both girls and boys) involvement in agricultural and rural development.
- Decentralizing governance and regulatory supervision.

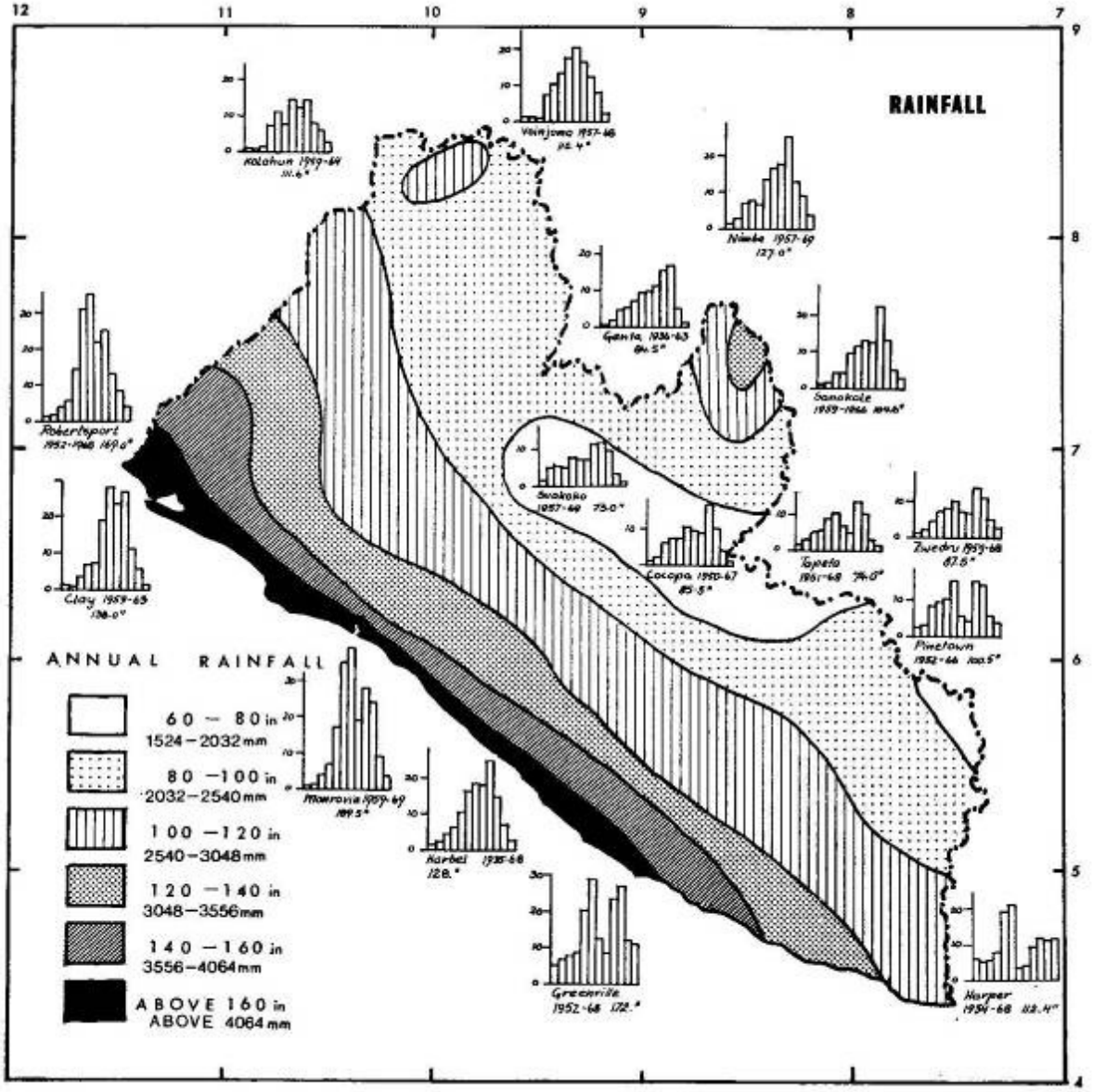
III. THE FOUNDATIONS FOR AGRICULTURAL DEVELOPMENT

G. Climate and Water Resources

53. The **climate** of Liberia can be summarized as follows. Annual rainfall is approximately 1,700 mm in the north and in excess of 4,500 mm in the south (Figure 4); it falls mainly between June and October (80–95% of the total annual level). Although data are scarce, evapotranspiration is estimated to be between 3.0 and 4.5 mm per day, and it is generally accepted that most areas have a water surplus for 5–8 months each year, with November to February being particularly dry months. Average temperatures vary between

24 and 28°C, while relative humidity ranges from 65–80%. Sunshine averages 2–8 hours per day. The wind conditions are described as generally mild. There is some evidence to suggest that rainfall patterns are changing and perhaps diminishing because of the removal of large areas of vegetation due to the farming practice of shifting cultivation.

Figure 4: Rainfall Map of Liberia



Source: GoL, 1983

54. Liberia shares **international water resources** with her neighbours; they comprise the St. John basin (Liberia and Guinea), the St. Paul basin (Liberia and Guinea), the Cestos basin (Liberia and Cote d'Ivoire), the Cavalla basin (Liberia and Cote d'Ivoire), the Moa basin (Liberia, Leone and Guinea) and the Mano basin (Liberia and Sierra Leone). Numerous bilateral treaties have successively governed the delimitation of the frontier of Liberia since 1885 on the Mano River and since 1892 on the Moa River. Some of these treaties have provided for the freedom of navigation and transit fishing and the protection of existing water use rights for the local population.

55. The country has nine **major river systems**, all of which are perennial, and run in a northeast to southwest direction into the Atlantic Ocean. They drain approximately 66% of the country and take their sources from neighbouring Sierra Leone, Guinea or Cote d'Ivoire. There are also short coastal watercourses, which drain about 3% of the country. The important lakes in Liberia are Lake Piso and Lake Shepherd, which have been identified as important wetlands for conservation. The total renewable water resource is estimated at about 232 km^3/year, making Liberia one of the African countries with the highest per capita renewable water resources, approximately 71,000 m^3/per person per year. Total water withdrawal in the year 2000 was estimated at 106.8 million m^3, of which agriculture took 57%, followed by the domestic sector with 28% and industry with 15% (FAO, 2005).

56. There is not much data on **groundwater resources** in Liberia but the country can be divided into three zones according to groundwater occurrence:

- The *soft rock areas*, which consist principally of sedimentary formations, occur mainly in rocks of the Pan African age in the Robert basin along the coast. Unconsolidated sediments are said to be well spread, especially in Bushrod Island, New Georgia, New Kru Town and Virginia. These are fairly extensive aquifers. The quaternary sediments that constitute the younger sedimentary rocks are shallow, up to about 30 m deep, 35-40m thick and are more than 15,000 years old (UNDTCD, 1987).
- The *fractured hard rock areas*, the extent of which is not known. It will be important to perform exploratory investigations to establish the extent of these possible aquifers.
- The *weathered igneous and metamorphic rocks* are soft rocks with appreciable porosity and hydraulic permeability, which are over-burdened rocks, not more than 30 m deep and not extensive. Their hydraulic properties, such as porosity, permeability, transmissivity, holding ability and yield, are not yet known.

57. The irrigation potential is estimated at about 600,000 hectares (ha) but only about 1,000 ha can be described as a surface irrigation facility. The total water-managed area in 1987, including rice swamp control, was estimated at about 20,100 ha (FAO, 2005). These areas include equipped lowlands (2,000 ha) and non-equipped cultivated swamps (18,000 ha). Irrigation infrastructure is virtually non-existent because of abundant water resources in the country. Water control structures for swamp rice production are extensive (although they are likely to be significantly degraded). Areas with good water control and having the possibility of two crops per year are limited. There are also peri-urban irrigation activities around Monrovia but the method of irrigation is predominantly by hand.

58. **There is no shortage of water resources for agricultural development.** Assuming that the water requirement of the staple rice crop is 1,500 mm, considering losses through surface evaporation, drainage etc., the total land area of about 400,000 ha of both upland and swamp rice, which is projected to be required to achieve rice self-sufficiency, will require an annual renewable water supply of approximately 6 billion m^3 or 6 km^3/year. This is only about 2.6% of the total annual renewable water resource of 232 km^3/year.

59. **Achieving the full irrigation potential of the country will require a more integrated land and water approach to address the prevailing constraints.** Liberia does not have a comprehensive policy document that addresses water development of water resources, possessing only dislocated pieces of legislation on land, mining, forestry and water supply that relate to water resources. Basic water management data for crops are not available and research in Liberia does not seem to consider this to be a priority, probably because of the abundance of water resources. Upland water management and water management on

slopes are not considered critical issues in the farming community. The upland soils are generally acidic, with low fertility and low water-holding capacity, and are prone to soil erosion, yet soil and water management is not much of an issue for the farmers. Even though there are limited data to support the claim, current land use practices are deemed to be having an effect on water resources, as suggested by the seasonality of some tributaries that used to be perennial, and changing rainfall patterns. Forest cover is being reduced due to current farming practices, thus posing a threat to soil fertility, biodiversity and the water resources of the nation.

H. Land and Soil Resources

60. Located on the west coast of Africa, Liberia occupies a land area of approximately 111,370 km^2, of which 96,160 km^2 (86%) is dry land and the remaining 15,210 km^2 is covered by water. It shares common borders with Guinea to the north, Cote d'Ivoire to the northeast and east, Sierra Leone to the northwest and the Atlantic Ocean to the south and southwest, with a coastline that is about 520 km long. The topography comprises mainly flat to rolling coastal plains running into some interior plateaus and then mountains in the north-eastern part of the country. The country is made up of four physiographic units: coastal plains (up to 100 m above sea level – masl), interior hills (100–300 masl), interior plateaus (300-600 masl) and mountainous areas (in excess of 600 masl).

61. The geology of Liberia can be classified into three major provinces based on rock age: the Liberian age province (2.7 billion years), the Eburnean age province (2.0 billion years) and the Pan African age province (0.6 billion years). There are three major types of soil in Liberia: laterites (latosols), sand (regosols) and swamp, which cover, respectively, 75%, 20% and 4% of the land surface (Table 5). Alluvial deposits constitute about 2% of the soils in Liberia. Generally, soils in Liberia are characterized by shallow layers of humus, low organic matter, high acidity, and deficiencies in magnesium and calcium, which not only serve as plant nutrients but also neutralize the acid in the soil. The soils range from weakly developed muds and hydromorphic clays along the coast and the inland swamps to shallow soils on the Plateau Mountains and lateritic hills and terraces in the north.

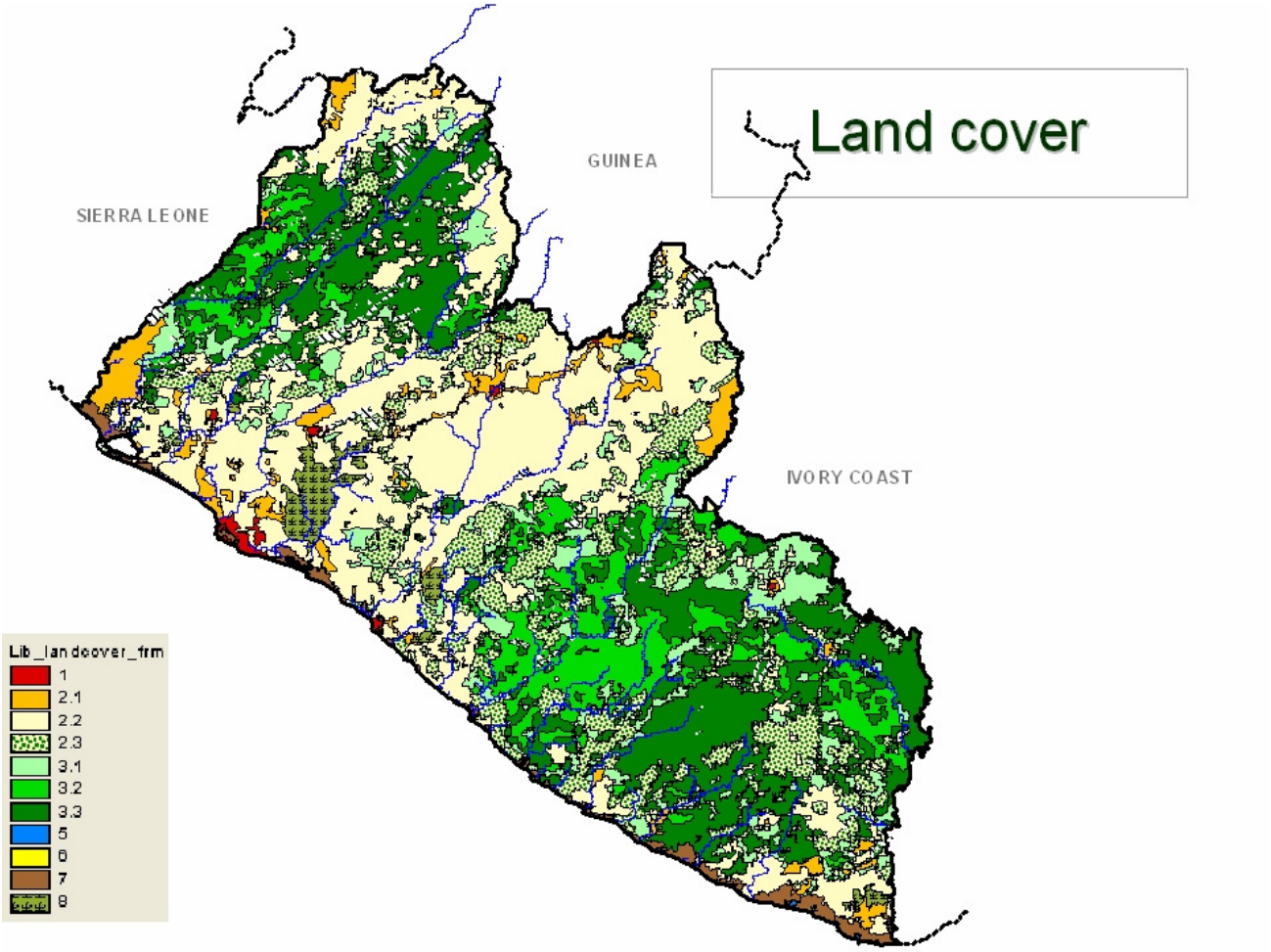
62. The first comprehensive **land use** map of Liberia was prepared in 1956 from aerial photographs taken in 1953. At the time, the map showed extensive forest vegetation in the northwest and southeast with some farmed areas. In 1981, another land use map was prepared from aerial photographs taken in 1979 (Republic of Liberia, 1983). This revealed the depletion of extensive forest cover, largely due to farming activities. The most recent survey, in 2004, has revealed the degree of further loss of forest cover (Figure 5).

Table 5: Soils of Liberia

Soil type	Liberian classification	% Area	Area* (ha)	Properties
Lateritic soils or latosols	Kakata, Suakoko and Voinjama Series	75%	8,352,750	Reddish brown, leached 10 cm topsoil, 4–6 % OM, acidic, well-drained, productive agricultural soils
Regosols or coastal sandy soils	Claratown, Sinko and Freeport Series	20%	2,227,400	Well-drained, 60% coarse sand, very low water-holding capacity, little humus and few mineral nutrients, not productive agricultural soils
Alluvial soils or swamp soils	Gbelle, Ballam, Grayzohn and Cuttington Series	5%	556,850	Waterlogged, grey hydromorphic soils, poorly draining, thick dark layer of loamy-peaty organic material with relatively high humus content

Source: Republic of Liberia (1983). Notes: * CAAS-Lib estimates

Figure 5: Land Cover in Liberia in 2004



Source: Bayol and Chevalier (2004). Land cover key: 1 = Urban areas; 2.1 = Predominantly rural agricultural domain; 2.2 = Agricultural areas with small forest presence; 2.3 = Mixed agricultural & forest area; 3.1 = Agriculture degraded forest; 3.2 Open dense forests; 3.2 = Closed dense forest; 5 = Free water; 6 = Savannah or bare soil; 7 = Coastal ecosystem complex; 8 = Agro-industrial complex.

63. According to the CFSNS (2006), around 60% of households in Grand Kru and Sinoe Counties report holding more land now than before the war (a similar proportion of households in other counties report a *reduction* in land holding), and these are areas where deforestation has been severe.

64. Apart from the plantations (rubber, cocoa, coffee and oil palm), which are noted for providing surface cover and minimizing soil erosion, the farming system has largely been one of shifting cultivation, with a fallow period of 9–10 years. The farming method includes felling/slashing, burning and planting. For the steep or rolling hills, removal of vegetation cover means increased soil erosion. This has been compounded by charcoal production, which is financially rewarding (see Table 3). Bushmeat is a major source of protein; however, hunting sometimes requires the burning of vegetation, thus further depleting biodiversity and soil fertility. According to the Republic of Liberia (2004), forest cover declined from 4.1 million ha in 1992 to about 3.5 million ha in 2001/02, and the MDG target is to reverse deforestation by at least maintaining the current forest cover levels. It is also expected that the land area protected to maintain biological biodiversity, which stood at 192,000 ha in 2003, will be increased to at least 534,000 ha by 2015. Deforestation is said to be at the rate of 1.5-2% p.a.

65. The land types that are present in Liberia include tidal swamps, coastal beach plains, flood plains, valley swamps, and low and high hills, all of which have different **land use capabilities** (Table 6). For the tidal swamps, high tides could destroy crops, requiring substantial investment in drainage if such lands are used for agricultural production. The coastal beach plains generally have low fertility and low levels of organic matter (OM) and will require some amount of fertilization when cropped. The flood plains also have the problem of potential flooding that can destroy crops, but proper timing and adequate drainage can improve the situation. The valley swamps, which are potential rice fields, are also poorly drained and have low fertility and organic matter. Adequate drainage and fertilization can improve their agricultural capability. The low hills are well drained and can be used for upland rice, vegetables and cassava but also have the problem of low fertility and are prone to soil erosion. Fertilization and long fallow periods can improve the agricultural capability of the soil.

Table 6: Agricultural Land Capability

Agro-ecology	Drainage	Crop suitability	Constraints	Improvement measures
Tidal swamps	Poor	Intensive lowland rice	High tide destroys crop	Adequate drainage
Coastal beach plains	Poor to well drained	Unsuitable for most crops except cassava, coconut, oil palm	Low fertility, low organic matter (OM)	Fertility management
Flood plains	Poor to well drained	Cocoa, oil palm, upland rice, irrigated rice possible	Potential flooding	Proper timing of cropping activities, adequate drainage
Valley swamps	Poor	Lowland rice	Water logging, low nutrients, low OM	Adequate drainage, fertility management
Low hills	Well drained; foot slopes poorly drained	Upland rice, vegetables, cassava	Low fertility, erosion	Fertility management, adequate fallow

Source: GoL (1983)

66. Nearly 5.4% of Liberian land, amounting to approximately 600,000 ha, is said to be cultivated, but 220,000 ha of this is reported to be under permanent crop or plantation, while the rest is arable (FAO, 2005). Broadly, these areas are uplands and lowlands or swamps. Swamps can be classified as mangroves, riverine grassland, flood plains and inland valleys. The degree of suitability of the swamps for agriculture is not known because they have not been characterized, but there is a general notion that the swamps are more productive lands for rice.

67. **Although achieving crop area expansion in a sustainable way will be a major challenge, there is no shortage of available land.** Projections of the annual rice production needed for self-sufficiency by 2015, assuming the per capita consumption of rice to be 124 kg, show that rice area would need to increase from 104,100 ha of traditional uplands, 50,000 ha of traditional swamplands, and 25,000 ha of improved swamplands in 2006, to about 232,300 ha of traditional uplands, 111,500 ha of traditional swamplands and 55,700 ha of improved swamplands in 2015. This constitutes an annual increase of 20–25,000 ha of rice lands. Assuming a minimum fallow requirement of 10 years, the total upland required using the traditional shifting cultivation system is approximately 2.3 million ha – equivalent to

about 20% of the available uplands[14]. Only about 10% of the available swamplands will be needed.

I. Land Tenure

68. **In the smallholder sector there are five broad types of land holding, with different levels of tenure security:** *deed holders* (or holders of other documents) with a comparatively high degree of tenure security; *customary occupation* without a deed, which results in relative security within the customary domain; *rental or leasing* of land with lower security; '*strangers' or 'borrowers'* of land who are not from a local area and do not rent, but who are allowed very temporary and insecure access to land, and must supply a token amount of crop produce to the owner to acknowledge that the land is owned by another – in essence acknowledging that the land is being loaned; and *squatters*, who, although they can be evicted at any time if they are discovered by the owner, are also the most aggressive about attempting to claim land by planting tree crops and through forms of adverse possession. While there are differences in tenure security among the different types of holding, all suffer poor tenure security and issues emerge when the different types interact.

69. For *deed holders*, the lack of a registry of land in Liberia means that no systematic records system exists whereby one can determine the true owner of land, the person to whom all or part has been sold, boundary locations, inheritance, the role and validity of historical deeds, and the occurrence of fraud. This puts the legitimate deed holder in a vulnerable position. Thus the fear of counterclaims (based on investments made by tenants or documents held by others) is based on common experience. The lack of a national land registry results in two problems: first, the growth over time of enormous confusion over what has been sold, subdivided, or inherited and by whom – the result of which is an inability to be certain of the owner, area purchased, or existing counterclaims; second, the creation of a situation whereby opportunists are able purposefully to make multiple sales of the same piece of land, with few or no repercussions – in one sense this is a variation of the 'culture of impunity' that exists following a war.

70. Other problems include confusion over different types of deeds, problems with adjudication, including enforcement of decisions, the theft of deeds during the war (particularly from the National Archives), destruction and loss of deeds, misrepresentation involving deeds, and the high degree of ambiguity, low capacity and significant level of confusion in the land and property institutions. This has resulted in the value of a deed as a piece of evidence (argument for claim) being lower relative to other forms of evidence for claims. An additional problem with deeds and documents is the issue of ill-defined boundaries.

71. *Customary tenure* has played a large and positive role in the reintegration and resettlement of displaced persons after the war, and it does not appear that there are pervasive, explosive problems with land allocation. There are, however, several issues of significant concern. Important among these is the profound lack of confidence among smallholders in customary courts and their ability to adjudicate land issues fairly. This has led to an increase in 'trial by ordeal' for many issues, including land conflicts.

[14] In reality, improved more intensive cultivation methods, even on uplands, would mean that less land would be required.

72. For *tenants*, their comparative insecurity allows them only to plant annual crops, with tree crops or other forms of permanent improvement specifically prohibited. Frequently, land is rented for only one cropping season in order to ensure that permanent claims will not be pursued.

73. Those who *borrow holdings* can be people who know the lender, or be strangers to the lender who essentially are 'begging land'. In this case planting trees is strongly prohibited, and a token amount of the crop yield is provided to the owner, in order to acknowledge that the borrower is not the owner of the land and will not claim the land. This is a highly insecure form of tenancy and the smallest infraction can see the borrower evicted. Also, a very good crop can result in the borrower being evicted so that the owner can take full advantage of the yield.

74. *Squatted holdings* constitute a large problem in both rural and urban areas. In some cases squatters can be seen as the most aggressive in pursuing forms of land claim involving tree planting or other improvements, and in cases of adverse possession. The latter can be pursued after 20 years of occupation with no attempt by the property owner to evict.

75. **Most land holdings lack formal deeds** although the proportion of households with (somewhat) secure title is greater in more intensive agricultural areas. Squatting is common in those areas that received a large number of IDPs, while leasing arrangements are rare (Table 7).

Table 7: Statistics on Land Holdings

	Mean farm size (acres)	% of HH with:				
		access to land	increased holdings since the war	plot with deeds	plot/community land – no deeds	squatter agreement
Bomi	1.8	68%	24%	33%	55%	11%
Bong	3.5	66%	15%	22%	62%	10%
Gbarplou	2.3	67%	34%	17%	70%	13%
Grand Bassa	3.8	81%	24%	6%	78%	14%
Grand Cape Mount	2.8	52%	32%	60%	24%	14%
Grand Gedeh	2.8	88%	22%	10%	78%	9%
Grand Kru	1.9	76%	63%	0%	99%	0%
Lofa	5.4	88%	36%	0%	97%	2%
Margibi	3.0	46%	22%	52%	24%	17%
Maryland	2.8	70%	33%	5%	73%	9%
Montserrado	3.8	39%	47%	26%	43%	25%
Nimba	2.6	72%	27%	48%	46%	5%
River Cess	4.2	76%	21%	6%	79%	15%
River Gee	1.9	90%	23%	1%	89%	9%
Sinoe	2.7	83%	59%	3%	91%	5%
Simple Average	*3.3*	*66%*	*31%*	*20%*	*67%*	*10%*

Source: CFSNS (2006).

76. **As is well documented in the literature, the various types of land holding provide different incentives for undertaking agricultural investments** (Deininger, 2003). For smallholders the prospects of technology adoption, such as planting of tree crops, and

investments such as soil conservation, terraces, or other long-term strategies differ with the different occupancy types noted above. Deed holders face two difficulties in this regard: the issue of multiple transactions over time (including fraud), and the designation of boundaries. In the case of the former, the current surge in cases of land and property dispute in all forms of courts that relate to various problems with deeds[15] means that deed holders who are involved in a dispute, or think that others might in any way have a counterclaim, may be unwilling or less willing to adopt long-term technologies such as tree planting or investments associated with longer term strategies.

77. For customary landholders the poor management of the relationship between formal and customary law, and the resulting historical taking of land for concessions, discrimination in adjudication, and internal custom problems, make some local communities reluctant to pursue such investments. Another problem is that such investments are visible, and if successful in increasing yields, they attract the attention of opportunists able to misuse the instruments of the state to claim such land. Other long-established, less disrupted local communities, however, are more secure and do not experience such problems to the degree that disrupted, recovering, returnee-stressed communities do.

78. For rented/leased and borrowed holdings the strong prohibition against investment in agricultural land is a primary constraint to improvements in yield. Particularly acute in this group is the desire to not appear too successful as a farmer, for fear that the land will be taken back by the owner (along with the standing crop), prior to the agreed time. As a result there is reluctance to pursue strategies actively that involve technology adoption or investments that would attract attention due to their success.

79. **Land issues contributed to the war; land continues to be an emotive issue with high levels of resentment resulting from specific land issues**, particularly in Nimba and Lofa Counties. There is a complex of problems, with concessions for access and exploitation of natural resources. Foremost among the problems is considerable confusion about which rights are included or excluded for concession holders. There is widespread understanding that a concession, while issued for the purpose of exploiting timber, rubber or minerals, or for agriculture, is in reality a very broad issuance of rights to claim and exploit land resources in whatever way suits the concession holder, although this may have little to do with the business proposal that was used to obtain the concession. There are also significant problems with the actual areas granted as concessions, with the total area granted as concessions in some counties adding up to more than the area of the county itself. Also, there seems to be little connection between the area granted or held and the area to be developed or exploited. Frequently the concession areas granted are much larger than the area actually developed.

80. Several issues regarding community and tribal lands have become problematic as a result of the war (and land relations prior to the war) and currently constitute a group of important issues that are in need of attention. It has been noted on a number of occasions that rural people need to have more of a voice on land (and other) questions. The Tribal Reserve Law has not been respected, which compromises the ability of MoA to manage agricultural efforts in the tribal areas. Tribal land is often claimed by outsiders, and the resulting disenfranchisement causes significant problems.

[15] It is reported that between 75% and 90% of all cases in courts in Monrovia are land and property related.

81. The arrangement whereby the government claims to own all the land in the interior of the country, and has issued concessions without consulting local communities, has also created considerable animosity. Exacerbating this animosity is the lingering perspective that only by moving from the rural areas to the city and becoming 'civilized' (baptized, married according to statutory law) can one own land privately. The MIA (the primary institution that deals with community and tribal lands), including local government, notes that the perception of people regarding community and tribal lands are quite confused. There is, however, some indication that at the village or community level local arrangements operate in greater clarity. The Mandingo land tenure issue is a particular problem that needs focused attention. The essence of the problem seems to reside in the question of whether the Mandingos are considered to be citizens of Liberia or not, and thereby whether they are able legitimately to claim and occupy land.

82. **There is an increasing incidence of land conflicts along existing ethnographic fissures.** There is some indication that the war and the current land situation have aggravated a Muslim–Christian divide in some parts of the country. Research is needed in order to ascertain the role that institutions, grievances, and entitlement connected to religion (and tribes, and other groups) have in resolving or creating divisiveness with regard to the land situation.

83. Women's issues come to the fore with regard to the land question, primarily in terms of land access and inheritance, with these two factors being intertwined. In this regard women tend to have fewer rights regarding land under customary law than under statutory law. The CFSNS has found that, currently, only 56% of female-headed households, compared with 68% of male-headed households, have access to land. As a proportion, almost twice as many men as women (33% compared with 16%) have individual access to land.

84. In 2003 a group of female lawyers in Monrovia, the Association of Female Lawyers of Liberia (AFLL), worked to help pass a new law, 'An Act to Govern the Devolution of Estates and Establish Rights of Inheritance for Spouses of Both Statutory and Customary Marriages' (MoFA, 2003). Thus, at present, inheritance of land by women is legally the same under statutory and customary law. The impact of the new law and the dissemination work carried out by AFLL on customary law regarding women, inheritance and land appears to be variable, but the law will probably require time and sustained effort for effective implementation. The new inheritance law has received resistance from some rural men (and parliamentarians) who would like to keep the previous inheritance arrangements intact. However, others have accepted the new arrangement. In this regard AFLL has noted that Muslim areas are more open to the new inheritance law than are other areas. A number of respondents noted that a great deal has changed for women in society due to the war, and the presence of a female president is an important factor.

J. Climate Change, Agriculture and the Environment

85. **Traditional farming systems in Liberia have minimal negative effects such as land degradation and loss of biodiversity**. Soil erosion resulting from poor land use practices can be a major cause of land degradation. However, traditional agricultural practices, such as shifting cultivation or slash and burn techniques, result in land degradation only if the fallow period is too short. In addition, improper clearing of vegetation and grass cover can lead to erosion by wind, and torrential rain can result in the removal of fertile topsoil through sheet erosion, or in the formation of deep gullies in the land.

86. Traditional farming with its low technologies dominates the agriculture sector in Liberia and does not pose much of a threat to agricultural biodiversity. The use of chemical inputs such as fertilizers is not widespread. Pastureland, estimated at 182,000 ha, is largely unexploited. The main environmental concern with regard to loss of biodiversity is the loss of valuable tree species (UNDP, 2006). Primary forest areas that contain mature tree species and secondary trees are normally cut and burned. This farming system reduces forest cover and contributes to the build-up of heat on the soil surface, which results in the destruction of soil organisms and other organic materials, as well as physical changes in the soil. Besides the loss of tree species and vegetation cover, wildlife is also affected.

87. Furthermore, the development of rubber and other plantations poses a threat to biodiversity and the environment, especially with the establishment of rubber plantations, which involves clearing and excavation. During the process, many species of flora are destroyed to make way for monoculture. There has also been an outcry about the method of waste disposal from rubber processing facilities (UNDP, 2006).

88. Wetlands in Liberia are threatened with degradation due to pressures from firewood gathering, pollution, unregulated settlements near wetlands, agriculture and industrial expansion. Other marine and coastal ecosystems are under threat from activities such as intensive fishing, shipping, land-based pollution and development, the increasing human population and the introduction of alien aquatic species. However, the most serious threats to the coastline and marine environment are solid waste, beach sand mining and beach erosion, not agriculture. The expansion of savannah found in Lofa County, predominantly in Foya District, is also of concern, bringing with it the threat of desertification in Liberia.

89. Although the current threat from Alien Invasive Species (AIS) in Liberia is low, because of the mainly traditional farming systems in use, measures need to be instituted now for the achievement of Target 10 of the Global Invasive Species Programme, which calls for the development of management plans for AIS.

90. Liberia is a signatory to the Convention on Biological Diversity (CBD) and the Biosafety Protocol, having ratified it on 8 November 2000, while the Cartagena Protocol was acceded to on 15 February 2002. The CBD calls on parties to regulate, manage or control the risks associated with the use and release of Genetically Modified Organisms resulting from modern biotechnology. In fulfilment of its obligations the GoL has pledged to honour the precautionary principle in recognition of the need for environmentally safe management of biotechnology (UNDP, 2006).

91. On a global scale, Liberia's contribution to global warming is negligible but like other African countries it is likely to be disproportionately affected by the impacts of climate change due to limited adaptive capacity and widespread poverty. Key sources of greenhouse gases in Liberia include fuel combustion for power plants and transport, the use of charcoal and fuel wood, the burning of forestry products for agricultural purposes and the burning of solid wastes. There are other minor sources such as industrial fuel combustion and emissions from vehicle and aircraft exhausts. The National Capacity Self-Assessment project identified a number of activities in Liberia that contribute to climate change (UNDP, 2006). These include shifting cultivation with a fallow period of less than 12 years, uncontrolled logging, charcoal production, and improper waste disposal.

92. A rise in sea level and an increased risk of flooding are some of the expected impacts of global warming. It is predicted that global warming will be accompanied by a rise in sea level of as much as 60–100 cm over the present century (EPA, 2005). It is projected that approximately 95 km^2 of land in the coastal zone of Liberia will be inundated as a result of a rise in sea level of 1 m. About 50% (48 km^2) of the total land loss due to inundation will be on the sheltered coast. Parts of the capital city, Monrovia, and its environs, West Point New Kru Town, River Cess, Buchanan and Robertsport, will be lost if protective measures are not taken. Furthermore, the mangrove systems along the coast will be lost (Wiles, 2005).

93. It has been said that global warming could extend the range of disease-causing vectors such as mosquitoes, leading to an increase in diseases such as malaria. Forests and wetlands could be affected by higher temperatures and changes in rainfall. The possibility of forest fires becoming more intensive and frequent will be high. Any significant change in the climate of Liberia will also disrupt the growth of some crops in certain seasons. Farming practices will be expected to change with the change in climate.

94. The vulnerability assessment for evaluating the impacts of potential climate change on fisheries resources follows a weight of evidence approach. Unfortunately, the fish catch potential of Liberian river fisheries cannot be calculated because of insufficient data to allow estimation of the fish stock biomass in and along the rivers.

K. Rural Infrastructure

95. **Rural infrastructure – rural roads, markets, irrigation systems, water supply, health and educational facilities – is essential to the quality of life in rural areas,** as well as being an important engine for economic development. All these elements have a critical role to play in any agricultural development strategy for Africa, with rural roads a particular priority (Commission for Africa, 2004). Research in Asia found that in villages with better roads, fertilizer costs were 14% lower, wages were 12% higher and crop output was 32% higher than in villages with poor roads (Ahmed and Donovan, 1992). In Africa, rural road construction has been found to be associated with increases in agricultural production, especially of non-food export crops, expanded use of agricultural credit, large increases in land values, proliferation of small shops and expansion of rural markets (Anderson *et al.*, 1982).

96. **Little investment, neglect and the conflict mean that transport infrastructure today is in an appalling state.** Roads are the major transport sub-sector within the country; railways constructed to assist the export of ore have been non-operational for over 20 years.[16] There is no domestic aviation service, and shipment between the four ports remains small. Primary roads make up about 1,798 km, of which 561 km is paved, while the entire secondary road network (2,504 km) and feeder roads (1,425 km) are all unpaved (Table 8). Assuming that about half of the other roads are farm to market roads, the rural road network (excluding primary and urban roads) would amount to about 7,830 km, giving a rural road

[16] Before the cessation of iron ore mining in 1990 about 500 km of tracks linking iron mines in Grand Cape Mount, Bong, and Nimba Counties to the ports of Monrovia and Buchanan were in use. During the conflict, the tracks and beds of the railroads were heavily looted. The line between Bong Mines and Monrovia has been reactivated by a private company, which provides a railway service for some passengers and light cargo. The line between Yekepa (Nimba) and Buchanan will be rehabilitated to accommodate the mining activities of Mittal Steel. Apart from the Bong Mines railroad, railways in Liberia have not been important in the transport of agricultural commodities.

density of 0.07 km per square km for Liberia. Although the average is greater than that of the humid and sub-humid Tropics of Africa in general (Spencer, 1996) it is significantly less than the density is required given the population density of the country. To achieve a road density equivalent to that of India at the start of the Green Revolution[17], Liberia needs to have a road density of about 0.160 km/km^2; other studies suggest an objective density of 0.186 km/km^2, (Republic of Liberia, 1978). To construct the additional 10,025 km of rural roads by the year 2015 would require an investment of US$500 million.

Table 8: Liberia's Road Network

Road type	Estimated length (km)		
	Paved	Unpaved	Total
Primary	561	1,237	1,798
Secondary		2,504	2,504
Feeder		1,425	1,425
Urban	80	400	480
Other (logging etc.)		7,800	7,800
Total length	641	13,366	14,007

Source: World Bank (2004b).

97. As a result of degradation during the last two decades the paved roads are severely pot-holed and the rest of the road network is in a very poor state of repair with many feeder roads having reverted to jungle. Vehicular travel in rural areas is difficult in the dry season and impossible in many areas in the rainy season, with about half of all villages rated as having no vehicular access (Figure 6). The roads in the south-eastern counties are muddy and difficult to navigate even during the dry season. Bridges on the dirt roads are made of logs, or logs and planks; they are particularly hazardous in the coastal south and south-eastern counties.

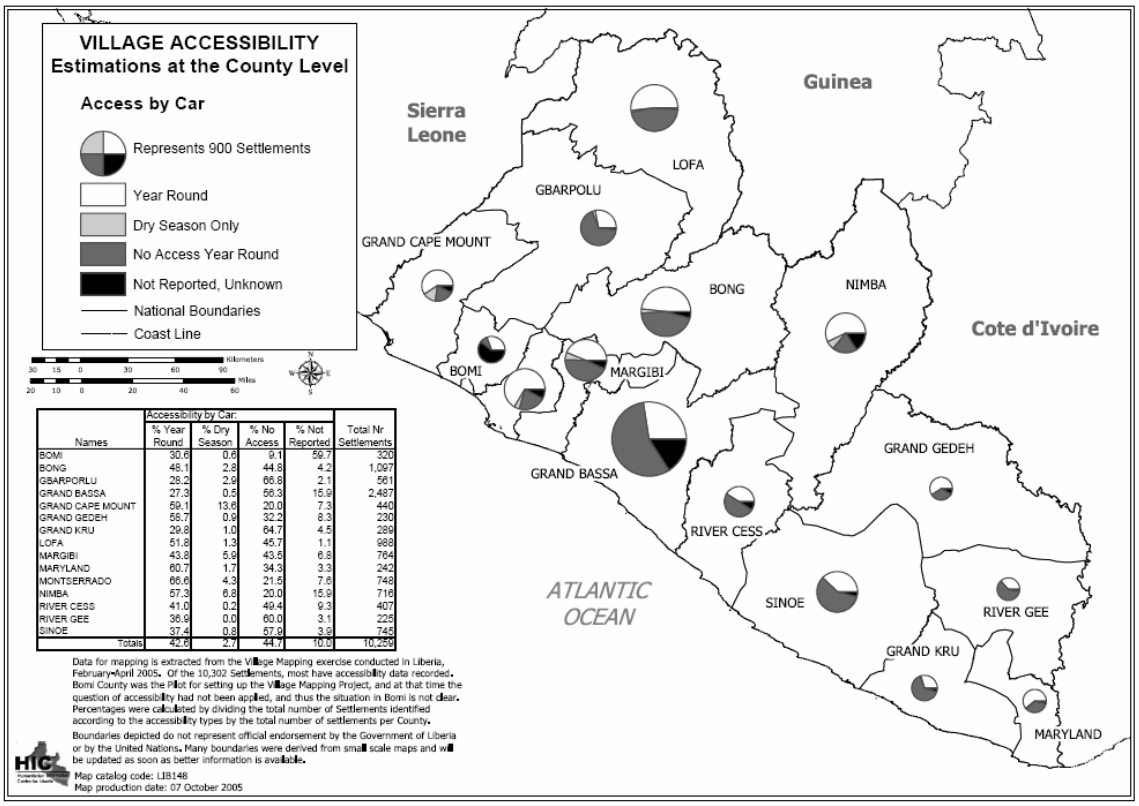
98. **As well as poor roads, there are few trucks to transport goods and a weak market for trucking services.** The Liberian trucking fleet was decimated during the conflict; today there are an estimated 20–30 trucking companies in Monrovia with a total trucking capacity of less than 2000 mt (MoA, 2007). Commercial truck carrying capacity ranges from 5–20 mt per vehicle. Most trucks imported into Liberia are secondhand, with an average age of 8–10 years. During the dry season, commercial transporters operate throughout the country with the exception of River Gee, Maryland and Grand Kru Counties, which are generally served by transporters from Cote d'Ivoire. Foreign registered trucks are allowed to operate in Liberia provided that they have the ECOWAS permit, and there are an increasing number of trucks from Guinea because of the current situation in Cote d'Ivoire.

99. There are four main seaports in Liberia: Harper, Buchanan, Greenville and the Freeport of Monrovia. The Freeport is the most active, and this is where most of the imported commodities arrive. The other three ports, mainly used for exporting logs, have limited

[17] The target density is calculated using the level achieved by India in 1950, when it had a population density roughly equal to that of Nigeria at the end of the last decade. The basic thesis is that countries need to achieve the road density that Asian countries had at the start of the green revolution in the 1950s if they want to use input-dependent green revolution technologies, such as the improved Inland Valley Swamp production system. Based on an assessment of agricultural potential in different Counties and the needs of the Agricultural Development Projects, a 1978 study (Republic of Liberia, 1978) considered a total road density of 0.186 km/ km^2 to be a desirable target for Liberia.

handling capacity, forcing vessels calling at these ports to provide their own handling equipment. Major constraints at the Freeport include channel shrinkage, blockage of berths by capsized vessels, limited and outmoded discharging and handling equipment, and heavy reliance on manual labour.

Figure 6: Village Accessibility; October 2005



Accessibility by Car:

Names	% Year Round	% Dry Season	% No Access	% Not Reported	Total Nr Settlements
BOMI	30.6	0.6	9.1	59.7	320
BONG	48.1	2.8	44.8	4.2	1,097
GBARPORLU	28.2	2.9	66.8	2.1	561
GRAND BASSA	27.3	0.5	56.3	15.9	2,487
GRAND CAPE MOUNT	59.1	13.6	20.0	7.3	440
GRAND GEDEH	56.7	0.9	32.2	8.3	230
GRAND KRU	29.8	1.0	64.7	4.5	289
LOFA	51.8	1.3	45.7	1.1	988
MARGIBI	43.8	5.9	43.5	6.8	764
MARYLAND	60.7	1.7	34.3	3.3	242
MONTSERRADO	66.6	4.3	21.5	7.6	748
NIMBA	57.3	6.8	20.0	15.9	716
RIVER CESS	41.0	0.2	49.4	9.3	407
RIVER GEE	36.9	0.0	60.0	3.1	225
SINOE	37.4	0.8	57.9	3.9	746
Totals	42.6	2.7	44.7	10.0	10,259

Data for mapping is extracted from the Village Mapping exercise conducted in Liberia, February-April 2005. Of the 10,302 Settlements, most have accessibility data recorded. Bomi County was the Pilot for setting up the Village Mapping Project, and at that time the question of accessibility had not been applied, and thus the situation in Bomi is not clear. Percentages were calculated by dividing the total number of Settlements identified according to the accessibility types by the total number of settlements per County.

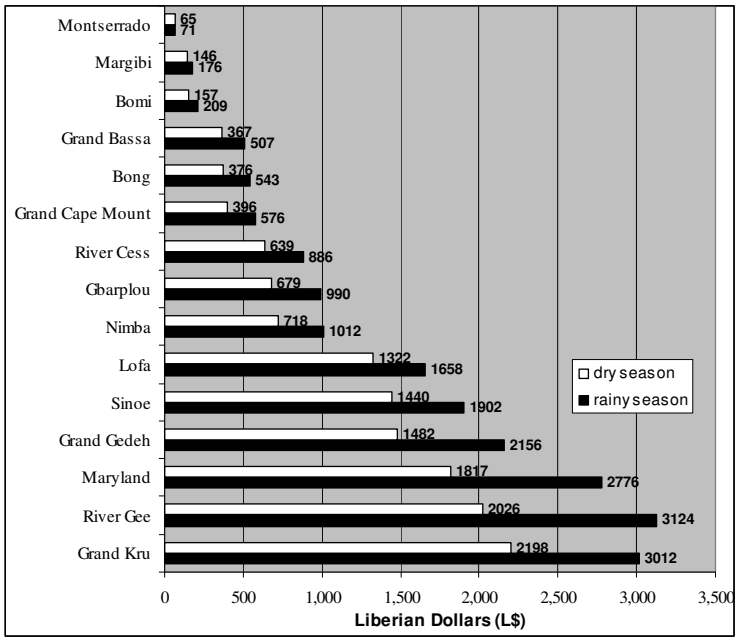
Boundaries depicted do not represent official endorsement by the Government of Liberia or by the United Nations. Many boundaries were derived from small scale maps and will be updated as soon as better information is available.

Map catalog code: LIB148
Map production date: 07 October 2005

Source: HIC, 2005

100. The consequence of poor roads and few transport services is that transport costs are high, particularly during the rainy season and especially on poor-quality roads. On average, transportation costs on paved roads are US$0.40/mt/km, compared with US$0.56/mt/km on unpaved roads (MoA, 2007). Costs on the paved roads remain generally the same in both wet and dry seasons. However, they can be more than doubled during the wet season for travel on the unpaved roads (Figure 7). Because of the inadequate coverage and poor state of the existing rural roads network, access to markets in rural areas is poor. Access to markets is crucial for households to purchase as well as to exchange and sell food and other agricultural products, but large parts of Liberia's traditional farming areas are isolated from markets or are costly – both financially and in terms of time – to access. While 81% of households access a weekly market they have to walk long distances to reach it. On average, households in Bong and Montserrado only have to walk for 1.5 hours, while households in Gbarpolu have to walk for nearly 6 hours, in Grand Gedeh up to 9 hours. The average for all households is 2.5 hours (MoA, 2007). Correspondingly, transportation costs are high: while households in Margibi pay less than L$150 to reach Monrovia (one way), households in Grand Kru pay on average around L$2,200.

Figure 7: Transport Costs for Passengers to Monrovia



Source: MoA, 2007

L. Liberian Farming Systems

101. **Forest-based farming systems cover the largest proportion of the land area in Liberia.** They consist of tree crop-based systems in which vegetables and other food crops are produced on a minor scale, concentrated in the central belt of the country, and root crop-based systems (with cereals) are concentrated in the northern region of the country. The third major farming system occurs in the coastal belt, with fishing as the major activity, combined with land-based mixed cropping systems (Figure 8).

102. Three main production systems characterize Liberian agriculture and can be differentiated by the scale of production:

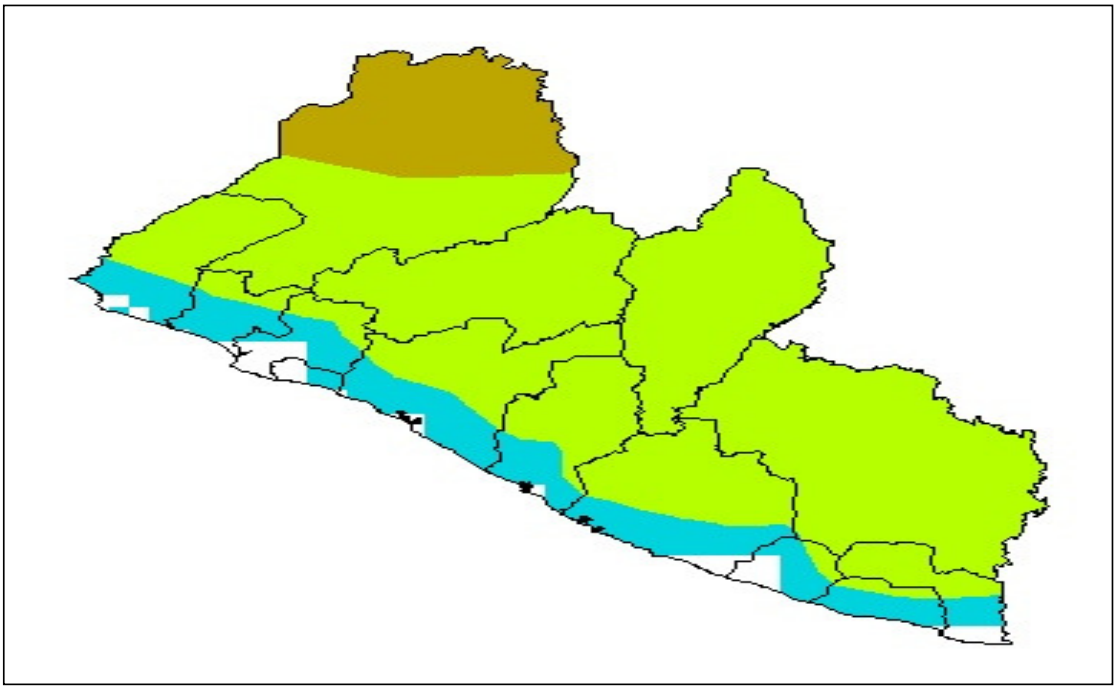
- *Large plantations* produce major export crops such as rubber, oil palm and to a lesser degree coffee and cocoa. This system can be sub-divided into the large commercial plantations that are owned and managed by the private sector (found particularly in the rubber and palm oil sectors) and the state-owned plantations run by the Liberian Palm Products Corporation and the Liberian Cocoa and Coffee Corporation. Production in this second group is limited, although they remain in existence.

- Domestically owned, *medium-sized commercial farms* produce industrial crops for export and livestock for the local market (although these farms are extremely small in number).

- *Small household farms* use traditional production techniques with extremely limited use of modern inputs. They make up the majority of all farming and therefore the livelihood

of the rural population. Although data are incomplete, evidence suggests that most rice farms are around 1 ha in size (FAO, 2001).[18]

Figure 8: Major Farming Systems in Liberia



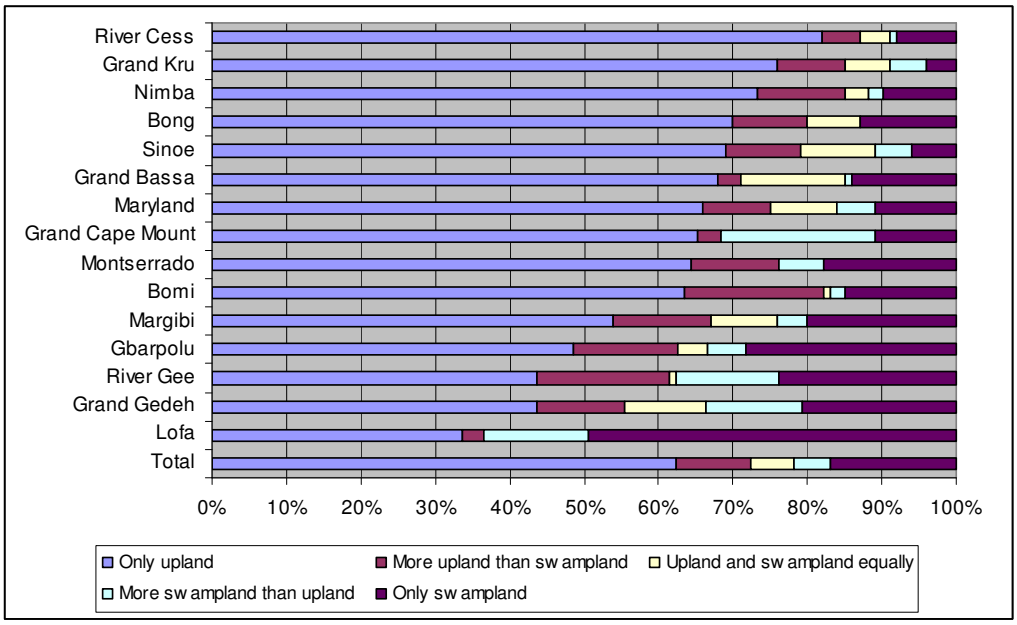
Source: FAO Country Profiles and Mapping Information Services (2006).

103. **Rice is the staple food of the country,** with over half of the households reported to have produced some rice in during 2005 (CFSNS, 2006). There are basically two systems of rice cultivation: upland rice and swamp rice. The former dominates: data from the CFSNS (2006) indicate that 63% of households fully relied on upland rice techniques, while 17% opted for swampland; 21% used a mixture of both, although upland was also more common in this group. Techniques differ across Liberia and reflect local agro-ecological conditions. Upland rice dominates in River Cess, Grand Kru and Nimba, while the majority of households in Lofa grow swampland rice only. Lofa County has the highest concentration of developed swamplands in the country as a result of past investment by donor-funded agricultural development projects (Figure 9).[19]

[18] In fact, 53.6% of rice farms are between 0.2 and 1.19ha, with a further one-quarter of rice farms 1.2–1.69 ha in size. For cassava, 70% of farms are less than 0.69 ha in area (CFSNS, 2006).

[19] The extent of upland cultivation may also have been underestimated because the majority of households have only recently returned, and thus missed the agricultural cycle for upland rice production in 2005.

Figure 9: Household Production of Upland and Swampland Rice



Source: CFSNS (2006).

104. **Upland rice cultivation is carried out purely under rain-fed conditions using shifting cultivation,** with the rice planted on farms in the same year that fallow or forest vegetation is cleared. Seed is broadcast. The upland farm is a mixed cropping system that usually includes maize, cassava and banana/plantain as well as local vegetables (e.g. pepper and bitter balls). Typical farming activities include brushing, felling, burning, clearing, broadcasting, ploughing, weeding and harvesting. The productivity of the farm depends on the length of the fallow period, with significant declines in yield if the fallow periods drop below 8–10 years (Finck, 1973). The rice is panicle harvested with a knife and is usually head loaded into a special store, where it is stacked on the panicle and threshed only when it is to be eaten or sold. Farm size averages approximately 1.1 ha, and rice yields are between 0.5 and 1.1 mt/ha.

105. **Swamp rice is traditionally grown in inland valleys that have been cleared, usually using hand labour.** The rice varieties are usually different from those grown on the uplands and the seed is usually transplanted. The swamps are extensively used for the production of rice in the rainy season and vegetables during the dry season. Other crops, such as cassava, are planted on mounds during the dry season. They are uprooted and stem cuttings are transferred and planted out on the uplands at the beginning of the rice growing season, when the mounds face the danger of submergence. Mounds constructed by inversion of soil and burying of stubble/grass help to decompose plant materials and thus to improve soil fertility. The rice is usually panicle harvested and stored in the same way as upland rice. Farm sizes are usually smaller and yields higher than on the uplands. A variant of the traditional swamp rice production system is what is known as 'recession agriculture', which is practised largely during the dry season. The farmers take advantage of the residual moisture of the soil in the swamps to grow vegetables.

106. A small number of more modern swamp rice production systems exist on specially developed swampland, where irrigation and drainage systems have been laid out to feed permanently cropped fields. Water control activities include digging and clearing of

canals/drains, bunding, flooding, drainage, ploughing and puddling, and levelling and repair. The varieties of rice grown are usually different from the upland varieties and of shorter duration. A few swamps attempt two rice crops a year and these are mainly the perennial swamps. Drainage is generally poor. Typical lowland rice production activities involve nursery, brushing and clearing, ploughing, puddling and transplanting, weeding, fertilizer application (if needed) and harvesting.[20] Fertilizer application rates are low: fertilizer is rarely available and, when it is, costs are high. The rice is usually harvested with a sickle, threshed in the field and stowed and carried in bags from the field. Yields of 1.6-5.5 mt/ha are possible.

107. **Cassava is the second most important food crop** with annual production estimated at 250,000 tons. Its advantages are that it can be planted all year round, the time of harvest is not critical, and it can be stored in the ground. It is therefore very important for food contingency, especially before the rice harvest. It is often planted as a follow-on crop after upland rice is harvested. In addition, cassava leaves are an important vegetable, although harvesting of leaves affects tuber yield (this effect is reduced in the rainy season). Crop area is around 0.5 ha, and yields are estimated to be between 6 and 10 mt/ha on upland farms. Cassava is grown on the flat and is usually intercropped with maize and possibly sweet potato and pepper. Tubers tend to be small and may be broken when harvested, which reduces shelf life.

108. **Other food crops** include vegetables such as pepper and bitter balls (garden eggs), as well as groundnuts, which have a ready local market. Yields of groundnuts range from about 700 kg/ha on uplands, to about 1.2 mt/ha in swamps. The groundnut crop requires a light sandy soil and is particularly attractive in the farming system because of its nitrogen-fixing properties, which enhances the yield of the following crop. Urban and peri-urban vegetable production is also practised on a limited scale, taking advantage of the ready market in the urban centres for vegetable crops produced through such activities. The potential for the use of motorized pumps for irrigation from shallow wells in support of urban and peri-urban agricultural activities also exists, especially in and around Monrovia.

109. **Recent crop production statistics are unreliable** but it is clear that production fell sharply during the civil war and has only recently recovered, while average yields have stagnated (at best). The FAO estimates reported in Table 9 suggest that domestic rice production (currently estimated to be 110,000 mt) is at roughly one-third of the level of the mid-1980s. Similar estimates for cassava production suggest a steady increase over the last 15 years to around 75,000 ha and 490,000 mt.[21]

110. **Previous efforts to introduce mechanical cultivation to address the labour constraints have largely failed.** The application of mechanical cultivation methods was mainly on plots of land measuring up to 2,000 ha for upland rice cultivation, although there was some land clearing for tree crop plantations and lowland rice cultivation. The equipment used was mainly tractors (crawlers and wheel tractors), ploughs, harrows and seeders in the

[20] The typical main drain/canal embankment specification is: 75–100 cm crest width, 75–100 cm height, 150-200 cm base width. The field bunds have the following typical specifications: 50–70 cm crest width, 40-60 cm height, 90–150 cm base width. Plot size is approximately 20 m x 20 m.

[21] It is unclear from the statistics whether this refers to industrial cassava production or simply home grown subsistence production. If the latter this would be understandable during a time of civil war, given food insecurity and the ability to leave cassava in the ground until needed. Such increases may not continue in the future.

uplands, and power tillers and caged-wheeled tractors in the lowlands. Combine harvesters were also used in a few cases. Previous assessments note that some methods have had limited success (e.g. improved felling methods using chainsaws) but mechanized clearing followed by tractor tillage were disastrous, mainly because they did not fit the farming systems used and there was insufficient training and facilities for back-up services (World Bank, 1984a).

Table 9: Rice and Cassava Production; 1990–2004

Year	Cassava (fresh and dried)			Rice		
	Area harvested (1,000 ha)	Production (1,000 mt)	Yield (mt/ha)	Area harvested (1,000 ha)	Production (1,000 mt)	Yield (mt/ha)
1990	55.00	380.00	6.91	175.00	180.00	1.03
1991	42.00	270.00	6.43	110.00	100.00	0.91
1992	40.00	280.00	6.67	120.00	110.00	0.92
1993	40.00	245.00	6.13	60.00	65.00	1.08
1994	29.00	250.00	6.25	45.00	50.00	1.11
1995	32.81	175.00	6.03	50.00	56.20	1.12
1996	43.30	213.26	6.50	75.60	94.45	1.25
1997	47.00	282.20	6.52	135.20	168.40	1.25
1998	55.50	307.00	6.53	161.90	209.40	1.29
1999	67.00	361.30	6.51	153.70	196.30	1.28
2000	72.50	440.50	6.57	143.50	183.40	1.28
2001	72.50	480.00	6.62	130.00	145.00	1.12
2002	75.00	480.00	6.62	120.00	110.00	0.92
2003	75.00	490.00	6.53	120.00	100.00	0.83
2004	75.00	490.00	6.53	120.01	110.00	0.92

Source: FAOSTAT

111. Although there were attempts to provide service to small farmers by the parastatal organization AGRIMECO, the scheme was short lived because of political interference in management, the offer of services to 'favoured' customers, and the economics of mechanization, which basically only suited large farmers who could afford the cost of US$370–US$865 per hectare for mechanical clearing of land. This compares with about US$75–US$100 per ha for clearing using hired manual labour for under-brushing and chainsaw gangs for felling of large trees. Major constraints to mechanization also included the unavailability or cost of spare parts, resulting in delays in work output and the abandonment and scrapping of relatively new equipment. Although mechanical clearing and cultivation of the uplands using tractors was not affordable by most small farmers, cultivation of the lowlands using power tillers was much more acceptable and affordable to individual medium-scale farmers and groups of small farmers (although the increased labour required to clear the land initially may undermine the benefits). In addition, the use of chainsaws and small-scale milling plants proved to be profitable, and they became visible all over the country.

112. The very few attempts to introduce draught animal cultivation failed due to the difficulties with keeping draft oxen in the forest zone country, and the unavailability of appropriate technology and experience with work oxen. There was also no policy on mechanization and use of agro-machines that addressed such issues as the appropriate types of mechanical equipment and the most appropriate areas or agro ecosystems were mechanical equipment could be used.

M. Food Crop Value Chains

113. As described in Box 2, value chain methodology provides an analytical framework to assess the competitiveness of Liberian agriculture. Value chains were constructed for vegetables, rice and cassava based on the fieldwork conducted and interviews with farmers and market traders. Very little value addition takes place, with the chains being limited, very short and often confined to only two or, at best, three stages along the chain. Previous analysis of value chains in the smallholder tree-crops sector has reached similar conclusions (Parker, 2001). There is little value being added[22] 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 longer distances or time periods without deterioration) but the value increase is marginal – purchases appear to be more for convenience than anything else.

114. **There is very little difference between small-scale farming and subsistence-based farming,** with little surplus available for sale in either case. Differences between trading, production and selling are small and differences in prices between the farm gate and the point of sale to the end consumer in most cases are also low.[23] 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 on to the market a substantial amount is lost through wastage.

115. Figure 10–12 present a schematic overview of some of the value added processing that occurs within the food crop sub-sectors. The presence of limited value chains does not mean that these commodities cannot become more important commercially, but investment would need to be made in training, in infrastructure, in setting up factories that convert the products into a higher value commodity, in food quality assurance and food handling, in storage, and in transport and packaging. Because much of the farming activity remains at 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%,[24] which impacts negatively on availability and the incentive to over-produce.

[22] The survey results showed 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.
[23] This is also confirmed by the food crops survey undertaken in October–November 2006.
[24] Based on mission interviews with farmers and traders.