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# FOOD AND ENTERPRISE DEVELOPMENT (FED) PROGRAM FOR LIBERIA

SUB-TITLE: POLICY ENVIRONMENT  
ASSESSMENT FOR LIBERIA'S RICE VALUE CHAIN  
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## **ABBREVIATIONS**

AGRM	Arkansas Global Rice Model
GST	Goods and Services Tax
M&E	Monitoring & Evaluation
MOA	Ministry of Agriculture
MOCI	Ministry of Commerce and Industry
MOF	Ministry of Finance
NGO	Non-Governmental Organization
SU	Standard Unit
USAID	United States Agency for International Development
UEMOA	West African Economic and Monetary Union
USG	United States' Government
WTO	World Trade Organization

## INTRODUCTION

The purpose of the Policy Environment Assessment (PEA) for Liberia's Rice Value Chain is to make recommendations to USAID/Liberia on its Feed the Future (FTF) Food and Enterprise Development (FED) strategy. The PEA will identify current policies, evaluate their impact on the rice value chain, suggest new or proposed policies, and propose future activities that will help to achieve FED strategy and the Ministry of Agriculture's National Rice Development Strategy.

The results of the PEA shall inform USAID/Liberia of synergies and opportunities for more effective policy, programmatic and strategic coordination among the US government's agriculture, health and nutrition investments as well as other donor initiatives and investments.

The PEA shall inform the USAID's FTF flagship project, FED, regarding:

Component 1: Increase agricultural productivity and profitability and improve human nutrition:

- Task 1. Value chain development
  - Sub-task 1.1 Identifying locations, stakeholders and specific strategies
  - Sub-task 1.5 Increased production and profitability of quality rice in Liberia

Component 2: Stimulate private enterprise growth and investment:

- Task 2.1 Enabling the policy environment for private sector growth

The rice sector in Liberia is the most important staple food components of the food and agricultural economy. In 2009 rice contributed 43% of the total daily calories consumed by the Liberian population<sup>1</sup>. Rice generated a value of \$81.1 million, the most of any food or agricultural commodity (Figure 1). Despite its importance in the food and agricultural economy, the productivity per hectare in Liberia is one of the lowest in the West African region and the world (Figure 2). This is explained in large part by the relative dominance of upland rice as the primary rice production system. Shifting or slash and burn cultivation on upland soils dominates rice and cassava production in Liberia. Table I shows the production data for both paddy rice and fresh cassava in Liberia for most recent crop years and a comparison with 1988 (pre-war)<sup>2</sup>. Domestic demand relative to domestic production has resulted in a significant deficit which has been met increasingly by imported rice (Figure 3)<sup>3</sup>.

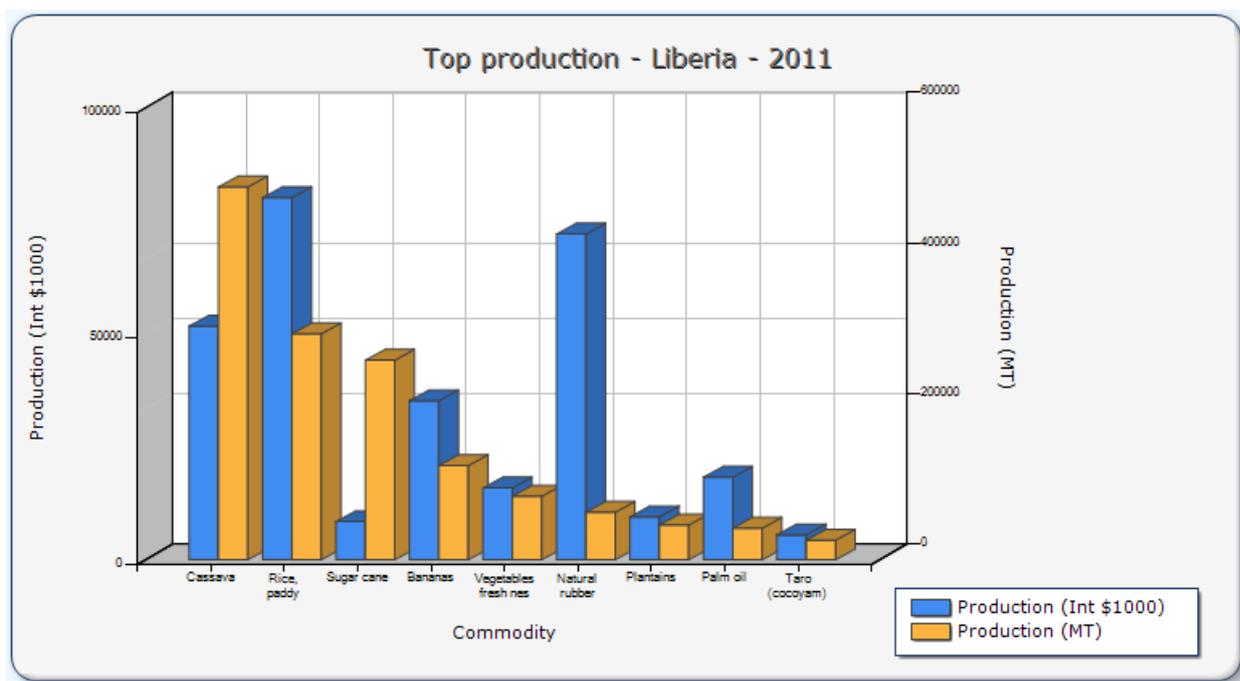
**Figure 1: Production value and quantity of commodities in Liberia, 2011.**

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<sup>1</sup> Food and Agriculture Organization, United Nations. FAOSTAT. Food Balance Sheet.

<sup>2</sup> Ministry of Agriculture. *2011 Agricultural Statistics Yearbook* (forthcoming).

<sup>3</sup> United States Department of Agriculture. *Production, Supply and Distribution Online*.



Source: UN/FAO FAOSTAT.

**Table I. Rice and Cassava Production, Area Harvested and Yield, 2008-2011 and 1988.**

Description	Unit	Year					Percent Change	
		2011	2010	2009	2008	1988	Av.(08-10)	Pre-war('88)
<b>PRODUCTION</b>								
Paddy Rice	Metric tons	290,650	296,090	293,000	279,000	298,630	0.4	(2.7)
Fresh Cassava	Metric tons	489,270	493,000	495,300	496,290	409,840	-1.1	19.4
<b>Total</b>	Metric tons	<b>779,920</b>	<b>789,090</b>	<b>788,300</b>	<b>775,290</b>	<b>708,470</b>	<b>-0.5</b>	<b>10.1</b>
<b>AREA HARVESTED</b>								
Rice	Hectares	238,780	251,230	247,580	222,760	235,760	-0.7	1.3
Cassava	Hectares	61,040	61,470	63,210	57,360	52,160	1.0	17.0
<b>Total</b>	Hectares	<b>299,820</b>	<b>312,700</b>	<b>310,790</b>	<b>280,120</b>	<b>287,920</b>	<b>-0.5</b>	<b>4.1</b>
<b>YIELDS PER HECTARE</b>								
Rice	Kilograms	1,217	1,179	1,183	1,253	1,270	1	(4.2)
Cassava	Kilograms	8,016	8,020	7,835	8,652	7,860	-1.9	2.0
<b>FARMS</b>								
Rice	Number	242,800	241,310	245,840	231,650	181,030	1.3	34.1
Cassava	Number	122,520	119,370	120,560	117,730	114,030	2.8	7.4
<b>Total</b>	Number	<b>365,320</b>	<b>360,680</b>	<b>366,400</b>	<b>349,380</b>	<b>295,060</b>	<b>1.8</b>	<b>23.8</b>

Source: 2011 Liberia Agricultural Statistics Yearbook (draft)

Figure 2. Rice (paddy) yields per hectare for selected West African countries and the World (MT/ha). Source: UN/FAO FAOSTATS.

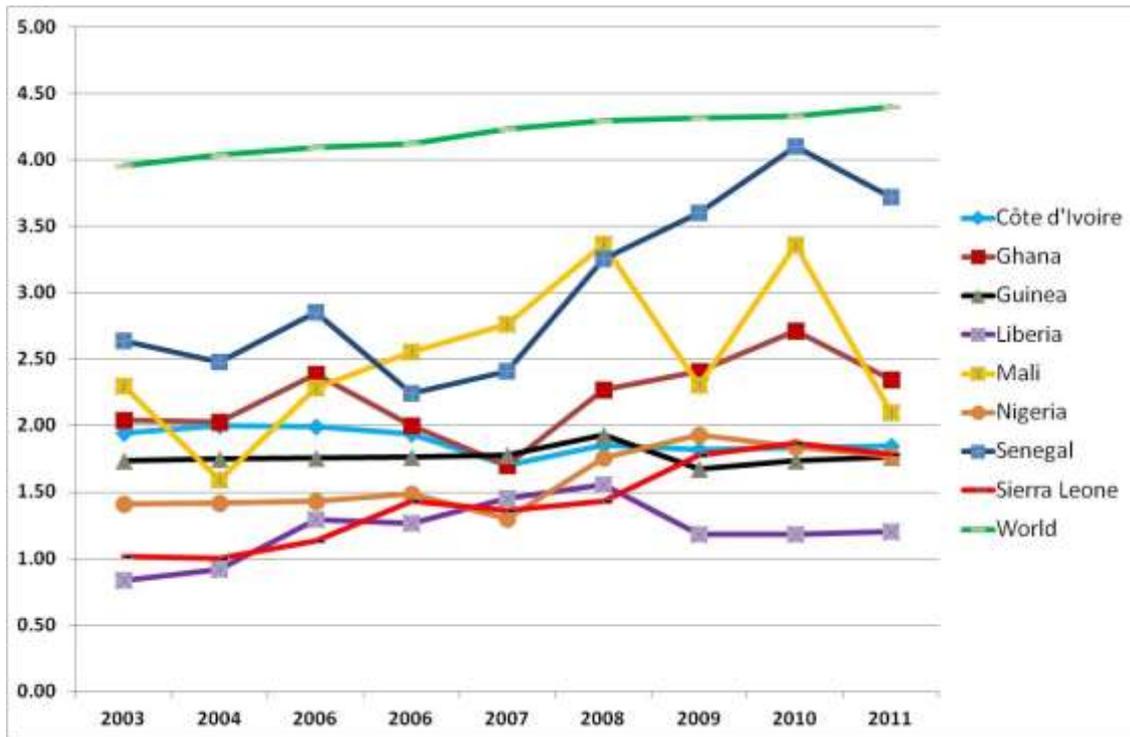
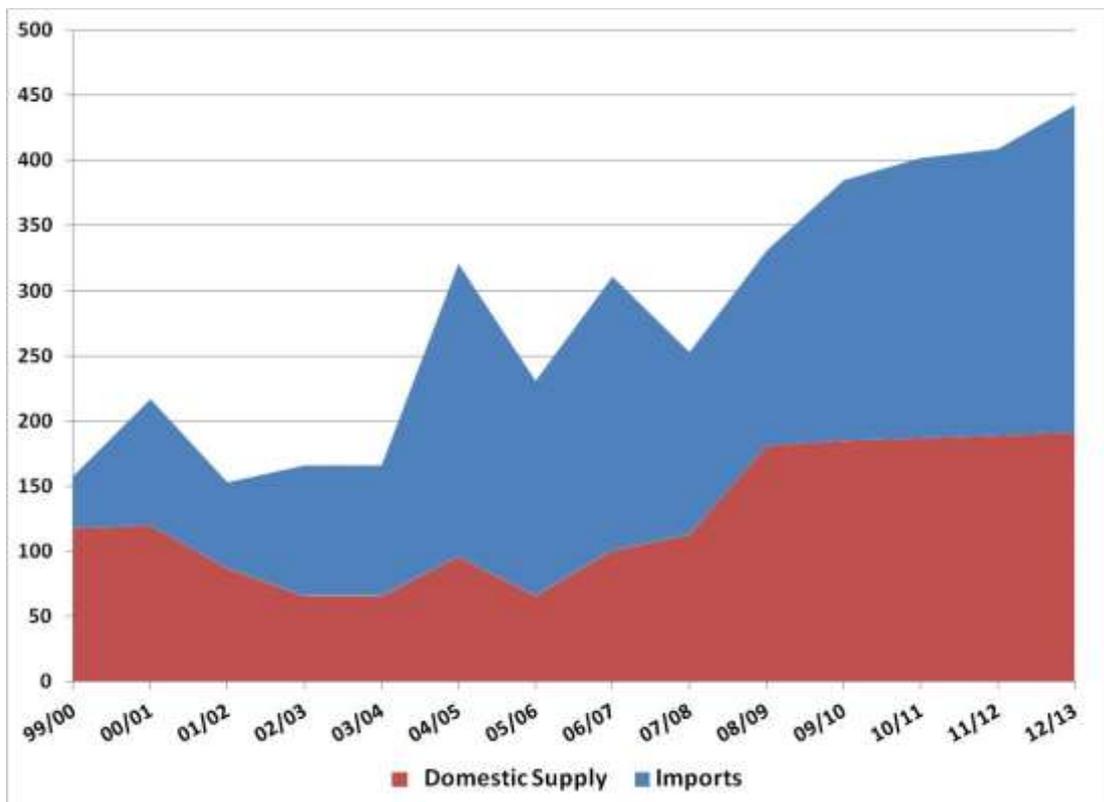


Figure 3. Liberia rice consumption by source, ('000 MT). Source: USDA PSD Online.



Facing low productivity, high post-harvest losses, and a severely underdeveloped value chain, the Feed the Future Liberia strategy<sup>4</sup> is focused on developing the rice sector as one of four selected value chains. The choice of the rice value chain is justified as:

*"Rice: FTF Liberia selected the rice value chain because it is the critical staple food for Liberians providing the primary source of dietary calories. Given its dominant role in Liberian diet and cultural identity, rice availability is also highly politically sensitive, an important dynamic for the GOL. Eighty percent of Liberia's rural agriculture households grow rice; however, imports are currently more than double the amount of local rice production. This leaves ample opportunities for smallholders to increase their income by producing and selling locally produced rice, provided that it can compete with imported rice." (pp 8-9)*

The framework for my policy environment assessment is based on discussions with farmers, merchants, FED staff, USAID/Liberia staff, officials of the Ministry of Agriculture, Ministry of Commerce and Industry, Liberia Institute of Statistics and Geospatial Information Services (See Annex II). Existing data, reports, policies, programs and strategies were sourced, reviewed and referenced. The Arkansas Global Rice Model (AGRM) is used to provide a context to understand the competitive environment from rice imports to which the domestic rice market in Liberia is confronted. Finally, this analysis is guided by the Gap Analysis that was provided by Wailes in 2012.

## **GLOBAL CONTEXT OF LIBERIA'S RICE ECONOMY**

### **OVERVIEW**

Given the high level of dependency on rice imports, it is useful to understand the current and projected global rice economy. The current global market is being driven by two events. The first is that of India's official lifting of its ban on non-basmati rice exports as of September 2011. The second is Thailand's implementation of paddy pledging scheme in October 2011, a price-floor support policy for Thai farmers.

The international rice prices are highly volatile due to a number of reasons. Rice has inelastic supply and demand throughout much of Asia, where it is the dominant food staple. While rice is the primary staple for half the world's population, it is thinly-traded. Only about 7% of rice production is traded as opposed to 10 percent for coarse grains and 16 percent for wheat (Wailes and Chavez, 2012). The international rice trade is highly concentrated with five dominant players (Thailand, India, Vietnam, Pakistan, and the U.S.) accounting for 89% of global net trade. Two recent events have had significant impact on the dynamics of the global rice market: one is that of India's official lifting of ban on non-basmati rice exports on September 2011 due to its mounting rice stocks; and the other is Thailand's implementation of paddy pledging scheme in October 2011, a price-floor support policy for Thai farmers which guarantees minimum prices for paddy rice that, at

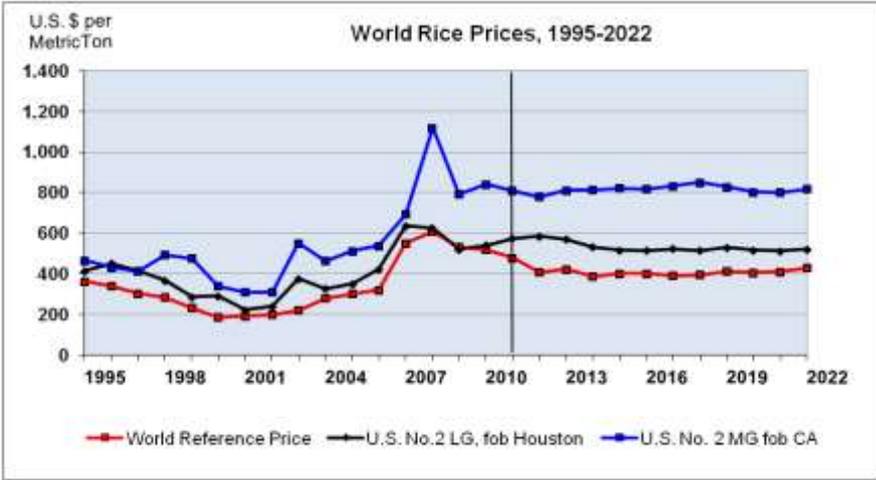
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<sup>4</sup> U.S. Government. (2011) Liberia FY 2011-2015 Multi-Year Strategy. USAID. [feedthefuture.gov](http://feedthefuture.gov)

the time of its initial implementation, were 30-50 percent higher than world market prices. While criticisms and opposition to the Thai pledging scheme abound, the government of Thailand has re-authorized the extension of the program for marketing year 2012/13. As expected, with Thailand’s mounting rice stocks, storage concerns, and limited export shipments at high prices—coupled with abundant rice supplies of India—Thailand recently announced that it will release a portion of its huge stocks from older crops to the open international market at a loss. Combined with large rice stocks from India, the global rice market is expected to face an abundant supply of rice over the projection period—with a consequent dampening effect on international rice prices. This situation is beneficial for food-deficit rice-importing countries in the developing world but could have uncertain response from rice producers and exporters (Wailes and Chavez, 2013).

A combination of slow growth in rice consumption and increased output driven by the use of higher-yielding varieties and hybrids and other improved production technologies—in line with more focused self-sufficiency programs of major consuming countries—are expected to dampen international rice prices over the next decade. The average international long grain rice reference price is projected to decline steadily from \$477 per metric ton (mt) in 2011 to \$430 in 2022. The average medium grain price however is generally stable above \$800 per mt over the same period.

Figure 4. World reference rice prices, 1995-2022 (Arkansas Global Rice Model Projections).



**ARKANSAS GLOBAL RICE MODEL (AGRM) PROJECTIONS**

AGRM is one of the two global rice modeling frameworks maintained by the University of Arkansas’ Global Rice Economics Program (AGREP). AGRM is a partial, non-spatial, multi-country statistical simulation and econometric analytical framework. The other model, RICEFLOW, is a spatial equilibrium framework that tracks bilateral trade flows and rice value chain adjustments. These models are updated on a regular basis and have been used to provide analyses for the World Bank, IRRI, USDA, OECD, Asian Development Bank, United Nations-Food and Agriculture Organization as well as many national governments and research institutes. This model links all countries through rice prices and trade (Wailes, 2012). The AGRM is disaggregated into 45 of the major rice producing, consuming and trading rice countries; and five rest-of-the-world regional aggregations: Africa, the Americas, Asia, Europe, and Oceania. Each country and regional model includes a supply sector, a demand sector, a

trade, stocks and price linkage equations. AGRM and RICEFLOW are research application tools that provide frameworks of the global rice economy as a system. As such they can address a wide range of issues and questions regarding price risks, policies, supply and demand distortions (Wailes, 2012).

The historical rice data for AGRM is obtained from the Production, Supply, and Distribution (PS&D) report of USDA-FAS and USDA-ERS Rice Outlook as of March 2013. The AGRM rice marketing years by country generally follow the USDA system. For example, *the year 2012 or marketing year 2012/13* in the model for Liberia refers to October 2012–September. See <http://www.fas.usda.gov/psdonline/psdAvailability.aspx> for details.

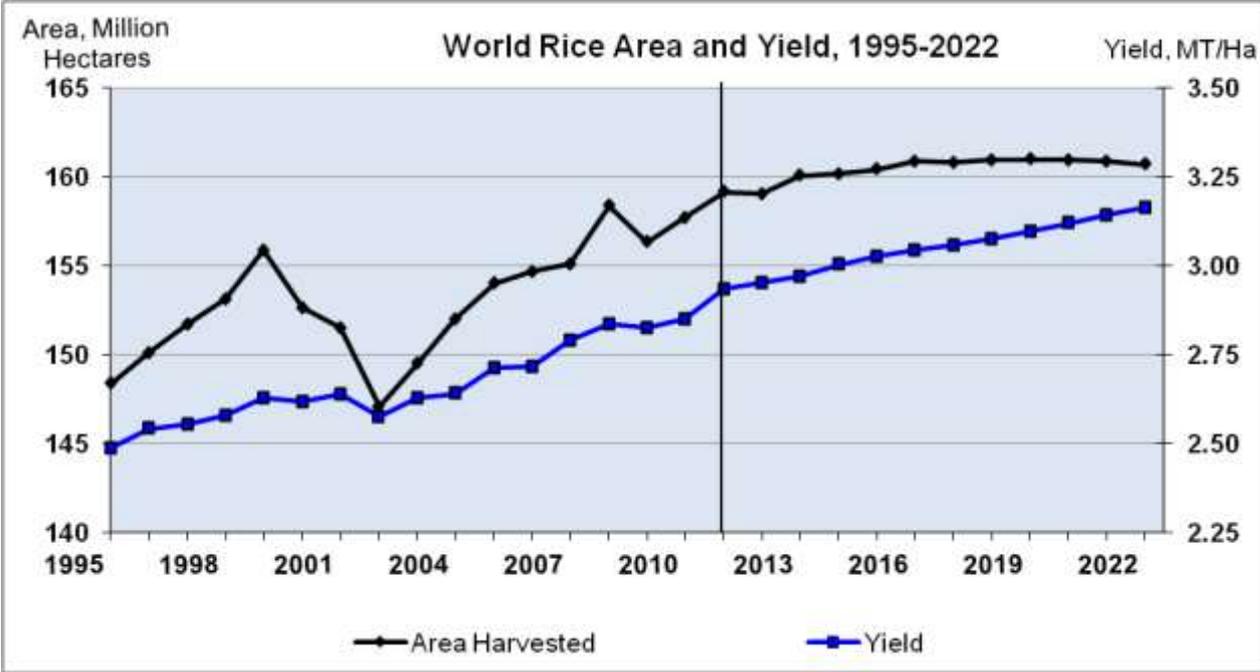
**TRENDS IN GLOBAL RICE SUPPLY, DEMAND AND TRADE**

Rice is the most important food crop of the developing world and the staple food of more than half of the world's population, accounting for more than 20% of daily caloric requirement (IRRI, 2013).

While Thailand’s intervention program is theoretically market-distorting because the producers are paid higher than normal prices, coupled with high minimum export prices--it has not affected the international rice trade as much as initially anticipated due to abundant rice stocks and increased price competition from the other major rice exporting countries of India, Vietnam and Pakistan. Consequently, Thailand’s rice export volumes in 2011 declined dramatically, i.e. by 44%, while export supplies from the three other major exporters dominated international trade. Thailand’s share of global net exports declined to 19% in 2011 compared to a historical average of 34% during the five-year period 2006-2010 (Wailes and Chavez, 2013). Over the baseline period (2011-2022), world rice output grows at 0.8% per year, with 0.7% coming from yield improvement and 0.1% from slight growth in area harvested. Driven solely by population growth, total global rice consumption gains 0.9% annually—as average world per capita rice use declines slightly.

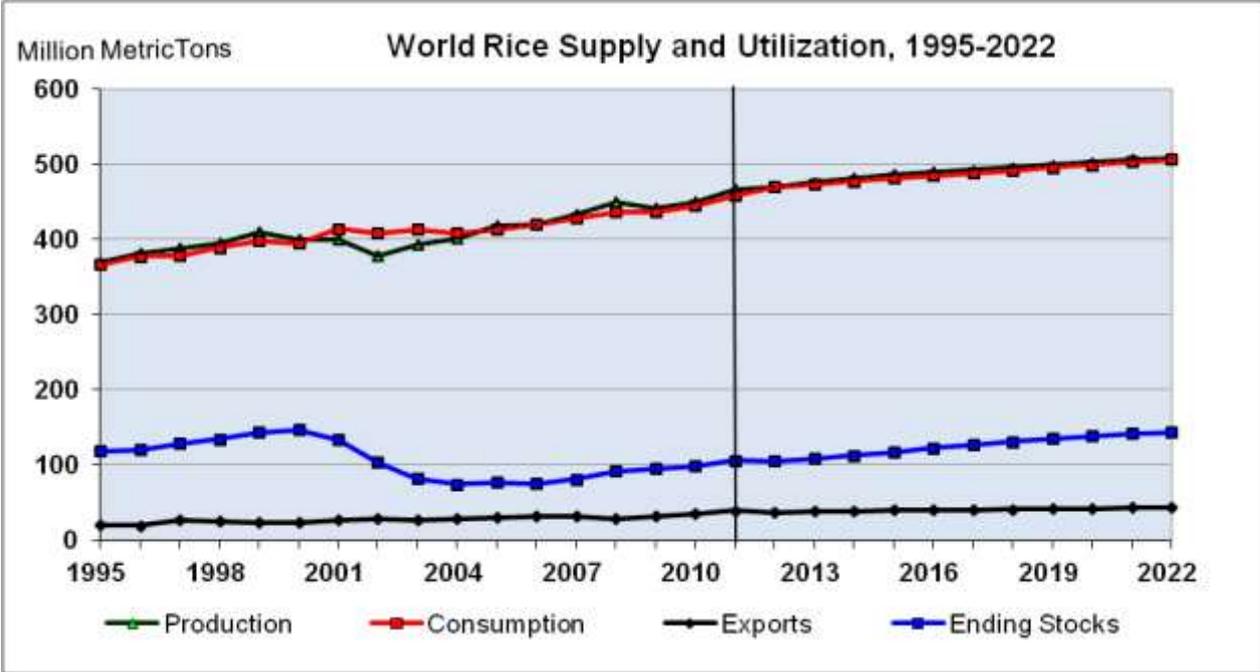
Net trade continues to grow at 1.6% per year, increasing from 32.5 mmt in 2011 to 38.6 million metric tons (mmt) in 2022. The bulk of the total world rice net import demand is projected to come from Nigeria, Indonesia, the Philippines, Iran, and Iraq which combined account for 31.7% ; and from Saudi Arabia, Malaysia, Cote d’Ivoire, Senegal, and EU27 which account for 17.0%.

Figure 5. Global rice area harvested and yields, 1995-2022.



Source: Arkansas Global Rice Model, 2013

Figure 6. World rice supply and utilization, 1995-2022.



Source: Arkansas Global Rice Model, April 2013.

**Table 2. World Rice Supply and Utilization Estimates.**

World Rice Supply and Utilization												
	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23
			(Thousand Hectares)									
Area Harvested	159,173	159,036	160,083	160,188	160,435	160,913	160,848	160,981	161,007	160,976	160,888	160,720
			(Metric Tons per Hectare)									
Yield	2.93	2.95	2.97	3.00	3.03	3.04	3.06	3.08	3.10	3.12	3.14	3.16
			(Thousand Metric Tons)									
Production	467,043	469,431	475,486	481,114	485,700	489,882	492,108	495,391	498,816	502,278	505,734	508,407
Beginning Stocks	98,821	106,100	105,798	108,486	112,694	117,169	122,489	126,835	130,941	134,467	138,124	141,160
Domestic Supply	565,863	575,531	581,285	589,599	598,394	607,051	614,597	622,225	629,757	636,745	643,858	649,567
Consumption	458,248	470,038	473,070	477,129	481,434	484,761	487,984	491,526	495,525	498,834	502,922	506,084
Ending Stocks	106,100	105,798	108,486	112,694	117,169	122,489	126,835	130,941	134,467	138,124	141,160	143,695
Domestic Use	564,349	575,837	581,555	589,823	598,603	607,250	614,818	622,467	629,991	636,958	644,082	649,778
Trade	39,335	36,496	37,883	39,146	39,893	40,449	40,779	41,189	41,649	42,039	42,872	43,371
			(Percent)									
Stocks-to-Use Ratio	23.15	22.51	22.93	23.62	24.34	25.27	25.99	26.64	27.14	27.69	28.07	28.39

Source: Arkansas Global Rice Model, April 2013

**Table 3. World rice net trade by country and world reference price estimates.**

<b>World Rice Net Trade by Country and Prices</b>												
	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23
<b>Net Exporters</b>	(Thousand Metric Tons)											
Argentina	670	625	636	623	646	646	653	669	693	696	702	715
Australia	320	442	414	373	362	357	379	398	393	377	394	384
Cambodia	795	967	895	883	839	931	1,007	1,078	1,238	1,477	1,598	1,602
People's Republic of China	-1,349	-1,919	-1,018	-999	-894	-907	-885	-890	-862	-868	-921	-865
Egypt	265	776	697	711	604	571	573	575	609	603	611	624
India	10,376	8,141	8,272	8,253	8,759	9,431	9,455	9,298	9,189	8,876	9,000	9,043
Myanmar (Burma)	690	572	532	763	927	1,105	1,242	1,337	1,421	1,501	1,569	1,587
Pakistan	3,440	3,524	3,845	3,834	3,902	3,916	3,797	3,897	3,793	3,840	3,935	3,940
Thailand	6,345	7,603	8,428	9,377	9,493	9,500	9,751	9,905	10,156	10,395	10,802	11,043
United States	2,607	2,644	2,676	2,586	2,566	2,419	2,328	2,371	2,379	2,330	2,341	2,329
Uruguay	750	854	978	981	968	973	970	994	1,009	1,036	1,048	1,047
Vietnam	7,617	7,016	6,999	7,109	7,190	6,944	6,901	6,925	6,966	7,022	7,009	7,154
<b>Total Net Exports *</b>	<b>32,526</b>	<b>31,245</b>	<b>33,352</b>	<b>34,494</b>	<b>35,362</b>	<b>35,885</b>	<b>36,169</b>	<b>36,556</b>	<b>36,984</b>	<b>37,289</b>	<b>38,089</b>	<b>38,603</b>
<b>Net Importers</b>												
Bangladesh	563	254	916	522	798	916	1,076	1,057	1,275	1,320	1,352	1,581
Brazil	-250	240	168	256	229	26	-83	-125	-272	-327	-379	-306
Brunei Darussalam	52	48	49	50	51	52	53	54	55	56	57	58
Cameroon	375	424	437	454	487	498	518	525	532	556	555	567
Canada	351	359	374	394	426	440	454	467	472	482	488	496
China - Hong Kong	415	427	437	443	443	446	450	452	451	453	453	454
Colombia	155	160	189	204	199	185	173	165	163	160	166	167
Cote d'Ivoire	1,373	1,059	1,107	1,072	1,126	1,147	1,161	1,229	1,280	1,325	1,379	1,422
European Union-27	1,083	1,126	1,176	1,176	1,151	1,147	1,125	1,100	1,078	1,055	1,021	986
Ghana	610	680	694	716	735	753	771	783	841	860	880	902
Guinea	260	295	378	406	411	394	372	371	393	421	449	471
Indonesia	1,960	1,775	2,662	2,982	2,935	2,974	2,853	2,812	2,866	2,779	2,836	2,919
Iran	1,750	1,838	1,937	1,959	2,021	2,070	2,105	2,150	2,180	2,201	2,231	2,247
Iraq	1,240	1,410	1,383	1,383	1,411	1,437	1,476	1,537	1,577	1,615	1,663	1,691
Japan	435	500	482	482	482	482	482	482	482	482	482	482
Kenya	430	433	413	458	442	469	444	453	486	515	548	544
Lao PDR	13	47	10	19	9	-9	-51	-101	-147	-196	-243	-295
Liberia	220	251	253	273	280	276	276	276	286	299	307	313
Malaysia	1,083	1,100	1,234	1,239	1,303	1,326	1,310	1,330	1,342	1,347	1,377	1,388
Mali	150	132	134	89	51	31	-62	-76	-95	-119	-102	-129
Mexico	644	718	776	791	792	791	795	807	836	863	877	883
Mozambique	375	442	464	486	511	507	540	552	570	581	612	626
Nigeria	3,200	2,641	2,541	2,614	2,703	2,787	2,832	2,889	2,943	3,018	3,086	3,144
Philippines	1,500	1,872	2,289	2,422	2,220	2,268	2,257	2,268	2,159	2,218	2,363	2,307
Saudi Arabia	1,130	1,208	1,211	1,237	1,260	1,293	1,328	1,359	1,386	1,408	1,422	1,439
Senegal	1,190	976	949	1,004	1,053	1,081	1,115	1,163	1,196	1,228	1,265	1,300
Sierra Leone	210	140	151	152	167	168	164	174	189	202	215	224
Singapore	350	358	366	372	375	377	381	383	381	384	385	383
South Africa	912	977	1,034	947	951	955	945	975	991	1,016	1,037	1,043
South Korea	377	601	400	409	409	409	409	409	409	409	409	409
Taiwan	140	128	128	128	128	128	128	128	128	128	128	128
Tanzania	100	166	89	93	99	43	21	39	35	46	46	20
Turkey	226	186	275	280	287	295	302	306	311	315	331	334
Other Africa	3,594	3,633	3,658	3,948	4,138	4,275	4,398	4,434	4,437	4,392	4,516	4,597
Other Americas	1,615	2,289	1,839	1,880	1,929	1,941	1,962	1,973	1,905	1,883	1,807	1,695
Other Asia	2,441	2,351	2,394	2,796	2,996	3,145	3,323	3,406	3,517	3,542	3,710	3,741
Other Europe	816	-5	324	282	264	265	291	297	285	289	285	284
Other Oceania	244	306	301	299	297	296	295	295	296	297	298	299
Residual	1,193	-299	-271	-224	-209	-199	-221	-242	-235	-213	-224	-211
<b>Total Net Imports</b>	<b>32,526</b>	<b>31,245</b>	<b>33,352</b>	<b>34,494</b>	<b>35,362</b>	<b>35,885</b>	<b>36,169</b>	<b>36,556</b>	<b>36,984</b>	<b>37,289</b>	<b>38,089</b>	<b>38,603</b>
<b>Prices</b>	(U.S. Dollars per Metric Ton)											
International Rice Reference Price	477	407	422	386	401	401	391	393	412	406	410	430
U.S. FOB Gulf Ports	575	584	569	530	515	514	522	515	529	516	512	521
U.S. No. 2 Medium FOB CA	809	778	812	814	820	818	832	849	828	801	801	816
* Total net exports are the sum of all positive net exports and negative net imports.												

Source: Arkansas Global Rice Model, April 2013.

**Table 2. Per capita rice consumption, world and selected countries.**

Per Capita Rice Consumption, World and Selected Countries												
	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23
	(Kilograms)											
Argentina	8.9	8.8	8.8	8.8	8.8	8.8	8.9	9.1	9.1	9.1	9.2	9.3
Australia	14.9	15.9	15.9	16.8	17.6	17.9	17.5	17.8	18.3	18.6	18.5	18.5
Bangladesh	216.3	214.2	214.8	214.9	214.9	213.8	213.4	212.8	212.2	211.5	210.7	210.9
Brazil	39.6	39.5	39.9	40.8	41.3	41.4	41.7	42.0	41.8	41.9	41.9	41.9
Brunei Darussalam	131.9	119.8	120.8	120.8	121.0	121.1	122.5	122.8	122.9	122.8	123.0	122.7
Cambodia	234.7	241.7	241.3	242.8	243.9	244.3	244.8	245.7	246.6	247.6	249.2	249.7
Cameroon	22.3	23.3	24.5	25.1	26.1	26.1	26.5	26.4	26.3	26.9	26.4	26.5
Canada	10.3	10.5	10.8	11.3	12.1	12.4	12.8	13.0	13.1	13.2	13.3	13.4
People's Republic of China	95.8	98.0	96.8	95.6	95.0	93.7	92.7	92.0	92.0	91.2	91.0	90.4
Colombia	35.8	35.4	37.9	38.6	39.0	38.9	38.4	38.3	38.6	38.9	39.0	39.0
Cote d'Ivoire	71.1	73.2	72.9	71.8	70.9	69.8	69.1	69.6	70.0	70.7	71.3	71.5
Egypt	44.1	46.7	47.3	48.0	47.3	46.6	46.4	46.0	46.1	46.0	45.9	45.7
European Union-27	6.5	6.6	6.6	6.7	6.7	6.7	6.8	6.8	6.8	6.9	6.9	7.0
Ghana	36.3	38.5	38.6	38.6	38.6	38.7	38.7	38.6	39.8	39.9	39.9	39.9
Guinea	128.0	131.2	136.1	137.7	137.9	136.0	133.3	133.1	134.5	136.0	137.1	137.2
China - Hong Kong	58.3	59.6	60.9	61.4	61.2	61.4	61.8	61.9	61.7	61.8	61.7	61.8
India	78.5	78.9	78.9	78.9	78.9	79.0	78.9	78.9	78.9	78.8	78.8	78.7
Indonesia	160.7	162.0	161.2	160.9	161.4	162.8	162.5	162.4	162.2	162.1	162.1	162.0
Iran	42.4	43.0	43.9	44.1	44.6	44.8	44.9	45.1	45.2	45.2	45.3	45.3
Iraq	45.2	45.4	45.3	45.4	45.8	45.7	46.1	46.9	47.2	47.6	48.0	47.8
Japan	63.2	64.2	63.2	62.1	62.0	61.8	61.7	61.0	60.5	59.4	59.4	59.4
Kenya	10.7	11.8	11.1	11.7	11.3	11.6	11.1	11.1	11.5	12.0	12.5	12.4
Lao PDR	222.3	229.1	229.9	229.7	229.5	229.2	228.7	227.8	226.7	225.9	225.4	224.6
Liberia	108.0	109.6	111.8	114.7	114.6	112.2	110.8	109.7	111.0	112.8	113.8	114.5
Malaysia	94.3	98.3	97.9	99.4	100.5	101.0	100.0	100.3	99.9	99.7	99.9	99.6
Mali	94.5	103.2	103.0	104.3	104.2	104.2	101.8	101.8	102.1	102.1	103.3	103.2
Mexico	7.3	7.4	7.7	8.0	8.1	8.1	8.1	8.2	8.4	8.5	8.5	8.5
Mozambique	24.0	25.8	26.8	27.6	28.1	27.4	28.1	28.0	28.1	27.9	28.4	28.3
Myanmar (Burma)	188.9	190.9	190.1	191.7	192.9	193.2	193.9	193.9	194.0	194.0	194.2	194.3
Nigeria	31.4	33.1	32.3	32.4	32.4	32.5	32.4	32.5	32.5	32.6	32.6	32.6
Pakistan	13.7	13.9	14.3	14.5	14.8	14.9	15.0	14.9	14.9	15.0	15.2	15.2
Philippines	126.2	127.2	125.3	126.7	125.5	126.0	125.7	125.4	124.7	125.3	126.3	125.7
Saudi Arabia	44.0	44.4	44.9	45.1	45.3	45.8	46.4	46.8	47.0	47.1	47.0	46.9
Senegal	102.8	104.1	103.5	104.3	104.8	105.3	105.7	106.1	106.3	106.6	107.0	107.2
Sierra Leone	178.2	149.7	153.3	151.8	152.6	151.2	149.2	149.4	150.5	151.3	152.0	152.0
Singapore	66.7	66.8	67.0	66.9	66.0	65.1	64.7	63.8	62.4	61.9	61.0	59.7
South Africa	18.0	20.3	20.3	19.7	19.7	19.7	19.6	20.0	20.4	20.8	21.3	21.4
South Korea	102.1	99.7	97.4	94.8	93.7	93.4	93.3	92.0	91.7	90.9	90.1	89.9
Taiwan	55.2	55.9	54.5	53.7	53.1	52.2	51.5	50.9	50.7	50.5	50.3	50.0
Tanzania	23.9	24.4	25.0	25.6	26.1	25.6	25.4	25.9	26.0	26.2	26.2	25.8
Thailand	155.9	157.5	157.0	156.5	156.2	156.1	155.9	155.7	155.5	155.5	155.4	155.3
Turkey	9.5	9.6	9.7	9.7	9.7	9.7	9.7	9.8	9.8	9.8	9.9	9.9
United States	11.1	12.7	12.8	13.2	13.5	13.7	13.7	13.9	14.0	14.1	14.3	14.4
Uruguay	19.6	21.7	21.9	21.7	21.6	21.3	21.0	20.8	20.8	20.8	20.7	20.4
Vietnam	217.0	220.6	220.5	219.7	219.4	219.4	219.1	218.9	217.1	216.5	216.7	216.1
Rest of World	21.5	22.2	22.2	22.5	22.5	22.6	22.8	22.7	22.7	22.7	22.6	37.9
World	66.0	66.9	66.6	66.5	66.4	66.1	65.9	65.7	65.6	65.4	65.3	65.1

Source: Arkansas Global Rice Model, April 2013.

## TRENDS IN LIBERIA RICE SUPPLY, DEMAND AND TRADE

Net trade for Liberia is projected to grow at 3.3% per year increasing from 220 thousand mt in 2011 to 313 thousand metric tons (tmt) by 2022. Consumption is expected to increase by 3% per year from 409 tmt in 2011 to 567 tmt by 2022. The domestic supply projection reflecting an annual growth of 2.7% is based on an expansion in area harvested of 1.7% per year and an increase in yields of only 1% per year. As such, the dependency on imports remains approximately 60%. The supply projection will be revisited later in the report based on what is potentially possible with successful technology intervention, institutional and infrastructural development as a result of the FED/USAID project and other projects that are designed to contribute to the Liberian National Rice Development Strategy.

The primary point of this section however is that if imports become less expensive over the projection period, it will be very difficult for Liberian rice to compete against imports. The challenge to develop a competitive rice value chain in Liberia will become that much more difficult. It is for that reason that we need to have a realistic framework to evaluate the potential for commercialization of the Liberian rice value chain.

**Table 3. Liberia rice supply and utilization estimates.**

Liberia Rice Supply and Utilization												
	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23
			(Thousand Hectares)									
Area Harvested	200	200	201	202	205	208	212	216	222	228	234	241
			(Metric Tons per Hectares)									
Yield	0.95	0.96	0.97	0.98	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.05
			(Thousand Metric Tons)									
Production	189	191	194	197	202	207	213	219	227	235	244	254
Beginning Stocks	0	0	16	17	18	18	19	19	19	20	21	21
Domestic Supply	189	191	210	215	220	225	231	238	246	255	265	275
Consumption	409	426	446	469	481	482	488	495	513	533	550	567
Ending Stocks	0	16	17	18	18	19	19	19	20	21	21	22
Domestic Use	409	443	463	487	499	501	507	514	532	554	571	588
Net Trade	-220	-251	-253	-273	-280	-276	-276	-276	-286	-299	-307	-313

Source: Arkansas Global Rice Model, April 2013.

## POLICY ENVIRONMENT ASSESSMENT FOR LIBERIA RICE VALUE CHAIN

### TRADE POLICY ISSUES FOR LIBERIA RICE

The current import policy for rice is essentially an applied zero ad valorem tariff rate. This policy was established in 2008 in response to the rice price crisis of 2008. It has been reviewed and announced by the President on an annual basis. Most recently, in January 2013, President Johnson-Sirleaf issued Executive Order No. 45 which continues the suspension of tariffs on rice.

Liberia is preparing for entry into the WTO and has been in the process of preparing its offer for some time. There will be strong pressure from WTO members, particularly by rice exporters, to keep tariff rates on rice low in response to Liberia's tariff offers. Liberia's nominal tariff schedule on rice for Liberia is 13% ad valorem. (Table 7)

**Table 4. Liberia rice tariffs and proposed transition to ECOWAS Common External Tariff.**

ECOWAS COMMON EXTERNAL TARIFF TRANSITION PLAN: RICE												
HS CODE	Tariff Description	Category CET	UEMOA Rate	SU	Liberia Rate	Current Rate Position	GST	Excise	Transitional			
									2011	2012	2013	2014
1006.30.00	In packings of more than 5kg or in bulk	2	10%	Kg	13.0%	Above	7%	0%	13.0%	10%	10%	10%
1006.30.00	In packing of at least 5kg	2	10%	Kg	13.0%	Above	7%	0%	13.0%	10%	10%	10%
1006.40.00	Broken rice	2	10%	Kg	13.0%	Above	7%	0%	13.0%	10%	10%	10%
1006.10.10.00	Seed	1	5%	Kg	2.5%	Below	7%	0%	2.5%	0%	0%	0%
1006.10.90.00	Other	1	5%	Kg	2.5%	Below	7%	0%	2.5%	5%	5%	5%
1006.20.00.00	Husked (brown) rice	2	10%	Kg	2.5%	Below	7%	0%	2.5%	5%	5%	5%

Source: MOCI and MOF.

Liberia as a member of ECOWAS will adopt the Common External Tariff (CET) set to begin Jan 1, 2014. Milled rice is expected to be in the 10% tariff band. Liberia is in the process of developing a negotiated entry over a three year period that would give it time to adjust to a rate higher than the ad hoc effect tariff rate since 2008 and a rate which is lower than its nominal rate. The result will be an increase in tariffs, providing trade protection benefit to Liberian rice production but a welfare loss to Liberia's rice consumers.

**ASPECTS OF RICE IMPORT TRADE IN LIBERIA**

Data for the two most recent calendar years on the major rice import shipments was provided by MOCI. This raw data include

Figure 7. Distribution of Liberia rice imports by month, 2011 and 2012.

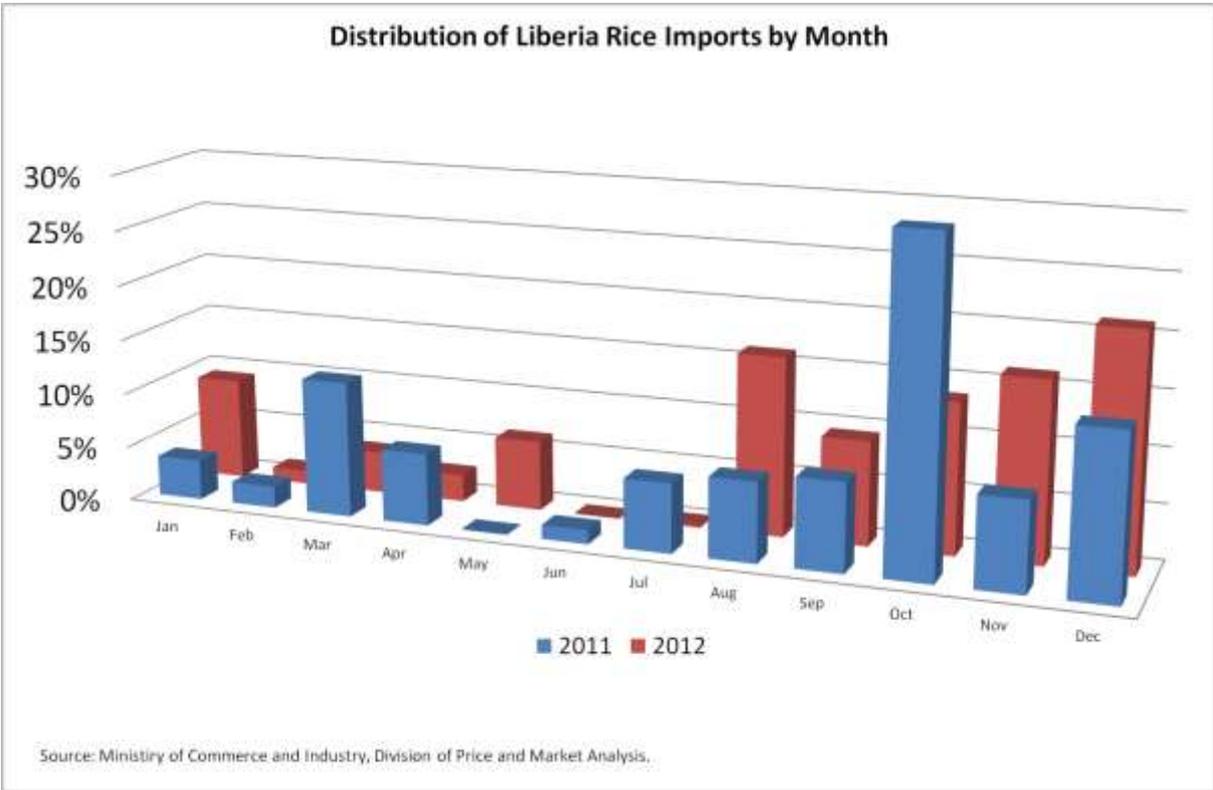


Figure 8. Monthly prices of imported rice by Liberia, 2011 and 2012.

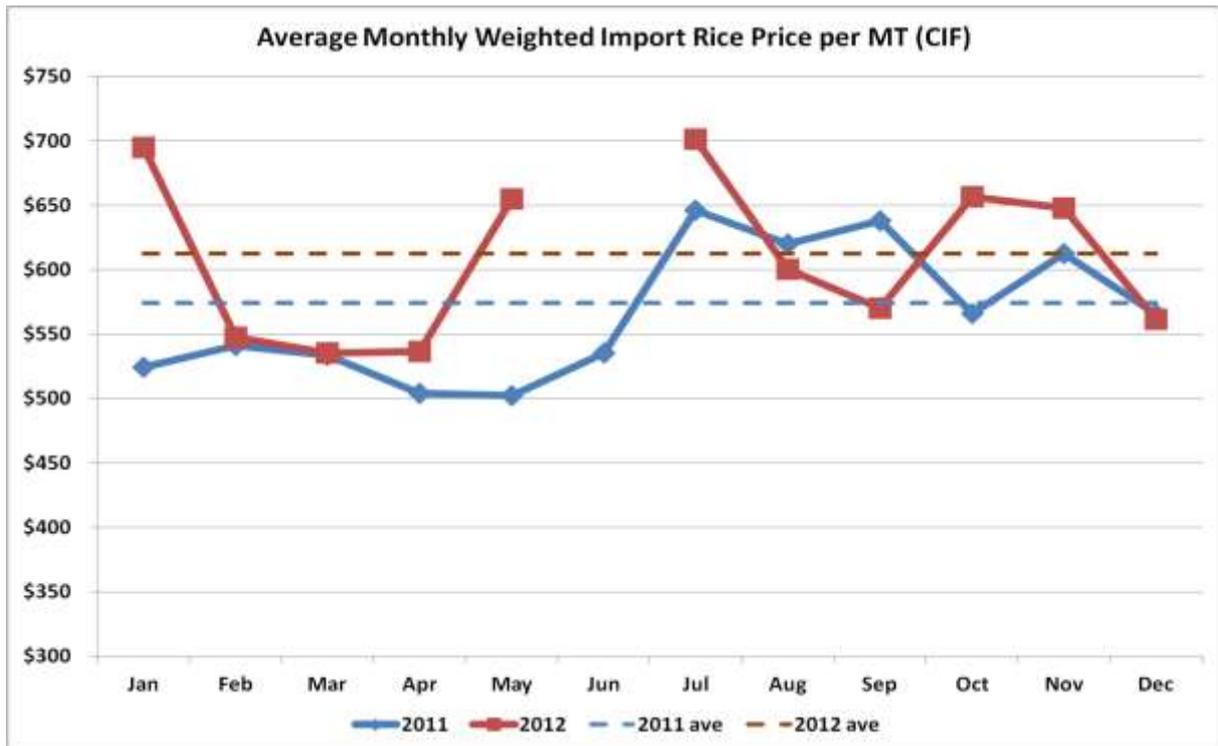


Figure 9. Country of origin shares of Liberia rice imports, 2011 and 2012.

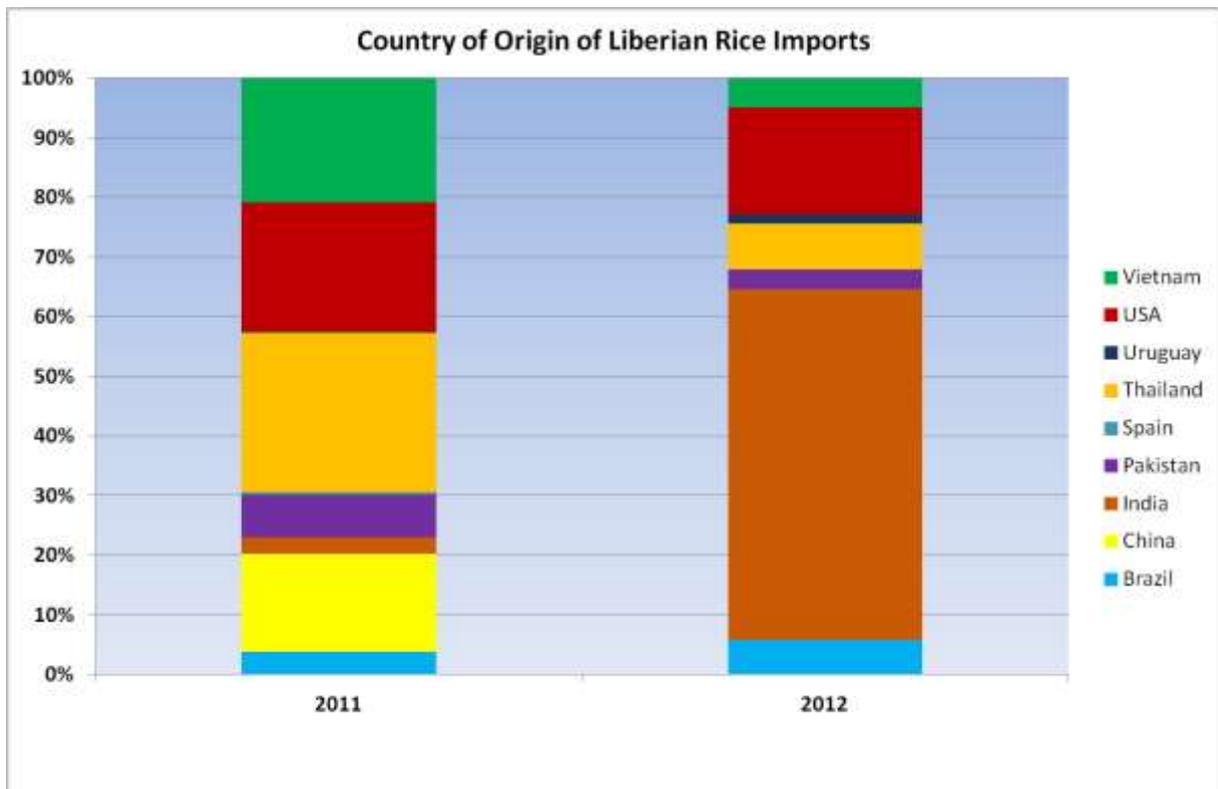
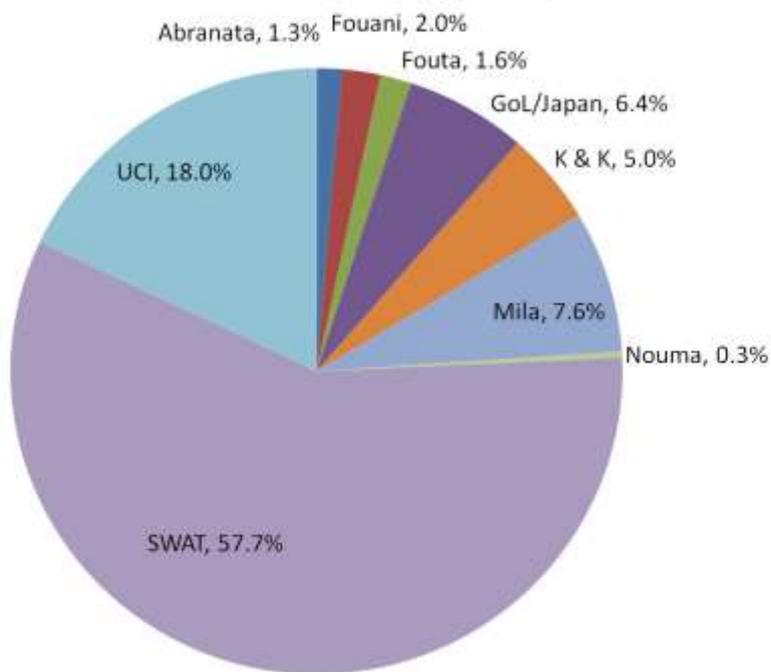
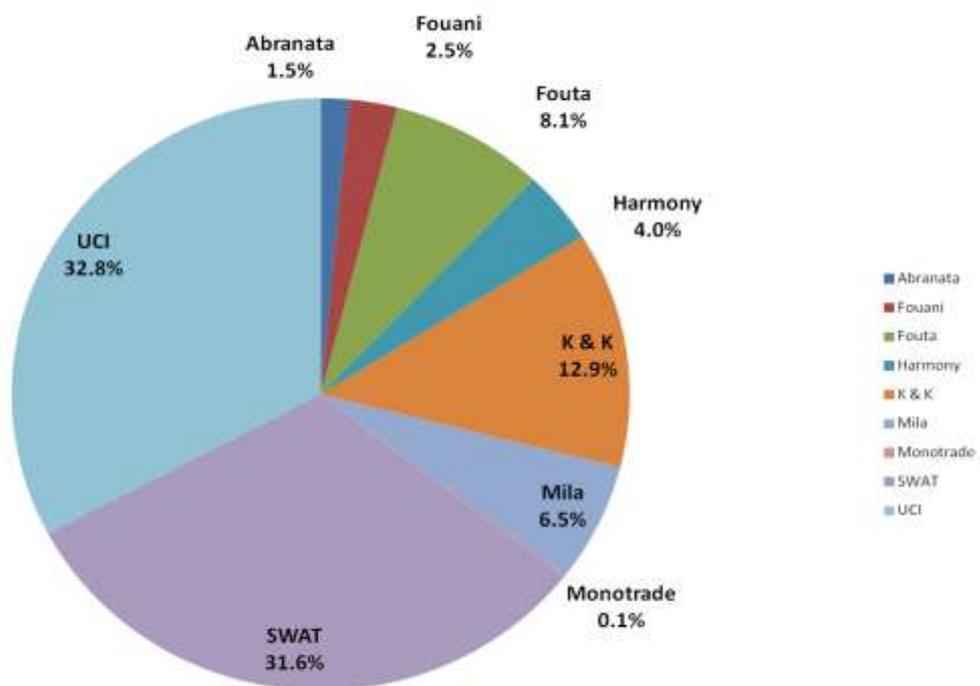


Figure 10. Market share of Liberia rice imports by trading firms, 2011 and 2012.

**2011 Market Share of Liberian Rice Imports by Trader**



**2012**



## **NATIONAL SEED POLICY AND REGULATORY FRAMEWORK**

The national seed policy and regulatory framework was developed and proposed by the National Seed Policy Workshop of March 2012 (see Annex B, Wailes 2012 Trip Report). Until now, this proposal has not been endorsed by the government and no legislation to authorize the framework has been considered. This is unfortunate because progress in developing a robust seed industry will rely upon having a systematic set of rules and regulations that will guide the certification of improved seed for farmers. Liberia is one of only a few countries that has no framework in place.

Nevertheless, there is an emerging informal seed industry sector consisting of several firms (e.g. Green Star, Arjay Farm, Green Farm). At least one of these firms has been assisted by the FED project through provision of farm equipment to expand the production and availability of improved rice seed. It is however a known fact that these firms are held by individuals with an ability to help move the national seed policy along. As the project pursues a strategy of assisting in the development and expansion of the informal seed sector, there is a question of whether this project support can be used to leverage the government and key individuals to assist in moving the seed policy and regulatory framework along? An associated question is whether the donor community in an advisory role to the Ministry of Agriculture can also assert itself in promoting the development of the seed policy? After a year of having a proposal developed it is disappointing to see that the policy and framework has not been enacted.

## **AGRICULTURAL INPUT ENTERPRISE DEVELOPMENT POLICY**

In addition to the regulatory framework for improved seeds, there is a broader set of concerns related to the availability and marketing of agricultural inputs that will be needed to lift productivity levels of Liberia's rice sector. While there were no formal interviews conducted with stakeholders regarding input availability and recommended use of inputs such as fertilizers and plant protection materials, anecdotal evidence suggests that, as with seeds, there is little in the way of a regulatory framework for labeling use of fertilizer and pest controls. Further, there is little or no basis for making technical recommendations on use of these purchased inputs.

The project demonstration plots do provide recommended applications of fertilizers and the results of the 2013 survey should provide some data that could be used to estimate returns to purchased inputs by rice farmers. However, at this point there is not enough information to be able to establish a set of guidelines that can help Liberia rice farmers efficiently use and apply purchased production inputs. Fertilizer trials and variety responses need to be conducted by CARI.

As for enterprise development, the SMSE conference held April 2013, sponsored in part by FED, will hopefully provide a framework by which the project can identify the constraints and needs of emerging input supply firms that will provide credit and technical and sales support to Liberian rice farmers.

## **RESEARCH AND EXTENSION POLICY ON UPLAND RICE AND LOWLAND RICE**

Two distinct rice production systems--upland and lowland--exist in Liberia. The upland rainfed rice system, which dominates (based on estimates as high as 90% of output), is characterized by low productivity levels (~ 1 MT/ha), using slash and burn techniques, within an integrated

multiple cropping system. The project baseline survey does not allow for analysis of rice produced under the upland and lowland systems. Therefore a more precise understanding of the differences between the two systems is difficult to establish at this point. A survey of the pilot demonstration plot fields in 2012 was conducted. However, the results as reported by FED M&E are limited by the small sample, sampling bias on yield estimates and large variance in the case of costs estimates (See Annex III).

A larger number of farmer association demonstration sites are being developed for 2013. This program will be county based for Bong, Grand Bassa, Lofa, and Nimba. Each county will have two FED supervisors who will work with technicians to provide different levels of support and advise for three groups of farmer association categories. Category A will receive the highest level of support with 1 technician assigned to 3 farmer associations. These technicians will be funded by FED and IFDC (International Fertilizer Development Center). Category B farmers will be assisted by technicians supplied by NGOs. Category 3 will be advised by Lead Farmers (trained by FED), who are selected by association members. Data will be collected systematically on production activities, yields and post-harvest activities. A control group of farmers who are not receiving any assistance by the FED project treatment will be included in the data collection.

This should help provide a much-needed baseline data set on productivity and costs of production, to evaluate the strategy regarding on-going efforts towards the two production systems.

## **RESEARCH AND EXTENSION POLICY ON UPLAND RICE**

A fundamental set of questions face FED/USAID with regard to **upland rice value chain**. The basic issue is whether this production system can be taken beyond subsistence production levels to achieve any degree of market competitiveness. The 2012 demonstration plot yield analysis estimated a surprisingly high yield of 2.19 t/ha on non-FED assisted plots. Were this an accurate representation of all upland rice production, this system could be well above subsistence levels and capable of contributing to the domestic market. However, with national yield estimates closer to only 1 t/ha, it seems likely that upland rice in general is far from generating marketable surpluses. Further, it must be noted that the upland rice production is part of a larger integrated farming system based on activities by rice farmers surveyed in the project baseline survey (Tables 8 - 10). The data show that upland rice and cassava tend to be highly integrated, particularly in Bassa, Bong and Nimba counties. Banana and maize are also produced by many of the upland rice farmers (See trip report Annex 8). Traditional vegetables including bitter ball, okra, and potato greens are also important.

Moving forward it would appear that barring an ability to improve upland rice yields above 2 t/ha, that the FED project would best pursue development of the upland rice production in the context of a farming systems perspective rather than a value chain approach. This means that efforts should give more attention to inter-planting of crops with rice that will improve subsistence production to improve household nutrition and labor allocation. If imported rice prices continue at current levels, then developing a market competitive supply of rice from the upland system would be expensive and challenging and divert project resources away from efforts that could provide better returns to achieving productivity gains in the lowland rice production system. Further judgment on this issue should wait until the 2013 demonstration trails can be analyzed to determine the impact of the technology and extension initiatives being provided by the project in 2013.

**Table 5. Diversification of Liberian rice farms, other food and tree crops, 2012**

	Number of Rice Farm Households (n=686) who also produced:							
	Cassava	Banana	Mango	Papaya	Oil Palm	Coffee	Cocoa	Maize
Bassa	70	21	1	0	1	0	3	56
Bong	144	63	3	3	16	2	13	65
Lofa	79	36	0	1	11	21	21	74
Nimba	268	152	39	33	61	11	36	137
<b>Total</b>	<b>562</b>	<b>272</b>	<b>43</b>	<b>37</b>	<b>89</b>	<b>34</b>	<b>74</b>	<b>333</b>
	Percent of Rice Farm Households							
Bassa	93%	28%	1%	0%	1%	0%	4%	75%
Bong	86%	38%	2%	2%	10%	1%	8%	39%
Lofa	53%	24%	0%	1%	7%	14%	14%	49%
Nimba	92%	52%	13%	11%	21%	4%	12%	47%
<b>Total</b>	<b>82%</b>	<b>40%</b>	<b>6%</b>	<b>5%</b>	<b>13%</b>	<b>5%</b>	<b>11%</b>	<b>49%</b>

**Table 6. Diversification of Liberian rice farms, vegetable production, 2012.**

	Number of Rice Farm Households (n=686) who also produced:							
	Bitter Ball	Okra	Potato green	Cabbage	Tomato	Lettuce	Other	
							Traditional	Exotic
Bassa	55	53	31	3	9	0	40	1
Bong	90	74	68	10	34	2	31	1
Lofa	89	77	41	6	41	0	42	0
Nimba	193	200	178	8	104	3	63	23
<b>Total</b>	<b>427</b>	<b>404</b>	<b>318</b>	<b>27</b>	<b>188</b>	<b>5</b>	<b>178</b>	<b>25</b>
	Percent of Rice Farm Households							
Bassa	73%	71%	41%	4%	12%	0%	53%	1%
Bong	54%	44%	40%	6%	20%	1%	18%	1%
Lofa	59%	51%	27%	4%	27%	0%	28%	0%
Nimba	66%	68%	61%	3%	36%	1%	22%	8%
<b>Total</b>	<b>62%</b>	<b>59%</b>	<b>46%</b>	<b>4%</b>	<b>27%</b>	<b>1%</b>	<b>26%</b>	<b>4%</b>

**Table 7. Diversification of Liberian rice farms, livestock and fowl, 2012.**

	Number of Rice Farm Households (n=686) who also produced:						
	Cows	Goats	Sheep	Guinea Fowl	Chickens	Ducks	Pigs
Bassa	0	23	4	0	50	19	6
Bong	0	34	13	0	100	27	15
Lofa	2	30	16	1	79	10	14
Nimba	2	99	70	16	221	79	55
<b>Total</b>	<b>4</b>	<b>186</b>	<b>103</b>	<b>17</b>	<b>450</b>	<b>135</b>	<b>90</b>
	Percent of Rice Farm Households						
Bassa	0%	31%	5%	0%	67%	25%	8%
Bong	0%	20%	8%	0%	60%	16%	9%
Lofa	1%	20%	11%	1%	53%	7%	9%
Nimba	1%	34%	24%	5%	76%	27%	19%
<b>Total</b>	<b>1%</b>	<b>27%</b>	<b>15%</b>	<b>2%</b>	<b>66%</b>	<b>20%</b>	<b>13%</b>

### RESEARCH AND EXTENSION POLICY ON LOWLAND RICE

A fundamental set of questions face FED/USAID with regard to **lowland rice value chain**. What priority should be given to lowland rice system improvement? What are the economic returns to investment in development/ rehabilitation of lowland rice areas? Can it be justified on rice alone? What is the extent to which lowland rice needs to be understood as an integrated cropping/aquaculture system? What is the role of lowland rice from a food security framework as a safeguard from dependence on rice imports and volatility in global rice markets? How to address this with respect to the global context, the environmental context, food security context and small-holder engagement.

First, it is best to understand that the Liberian government has placed a heavy emphasis on the rehabilitation of the lowland rice production areas as reflected in the National Rice Development Strategy (NRDS). While the overall objective of achieving rice self-sufficiency by 2017 is unlikely, as a strategy, the government has indicated a commitment to develop the lowland rice production areas as a key component to achieve greater food security.

As stated on p. 16 of the NRDS, *"To attain national rice self-sufficiency, beginning 2014, on annual bases, additional 500 ha per county, will be put under cultivation both in the lowland rain-fed and lowland irrigated ecosystems, without increasing the area currently under upland cultivation."*

The ambitious NRDS expected production outcome is presented in Table II. It shows that both expansion of lowland area and intensification of lowland to achieve higher yields is at the heart of the national strategy. The FED strategy needs to focus on expanding the coverage, using number of lowland hectares the FED rice technologies has expanded to as an important metric for intensification and productivity improvement on existing lowland areas. The investment in expansion of lowland areas should be left to other projects such as the World Bank funded WAAPP and IADP projects. Expansion of the lowland production areas are part of the Liberia Agriculture Sector Investment Program (LASIP) which was developed and validated in 2010 to

transform Liberian agriculture within the context of Comprehensive Africa Agriculture Development Program (CAADP) between 2010-2015<sup>5</sup>.

**Table 8. Liberia National Rice Development Strategy Production Goals by 2018.**

Ecosystem	Area cultivated 2009 (Ha)	2018 projection (Ha)	Production output (MT)		
			2009	2018 1-crop/yr	2018 1.5 crop/yr
<b>Upland</b>	190,000	190,000	171,000	380,000	380,000
<b>Yield/ha</b>			0.9 t/ha	2 t/ha	
<b>Lowland Rain-fed</b>	20,000	64,500	24,000	225,750	338,625
<b>Yield/ha</b>			1.2 t/ha	3.5 t/ha	
<b>Lowland Irrigated</b>	2,000	45,500	4,000	273,000	409,500
<b>Yield/ha</b>			2.0 t/ha	6 t/ha	
<b>Total</b>	212,000	300,000	199,000	878,750	1,128,125

Source: Table 2, p. 18. *National Rice Development Strategy (2011)*. Ministry of Agriculture.

The FED project is committed to improving the productivity of the rice value chain and therefore will be expected to help the government move toward achieving this national development strategy. The FED contribution in developing the rice value chain is in improving the yields per hectare through demonstration of new and appropriate technologies that enhance yields and promote efficiency through establishment of input and output enterprises. To what extent this approach can be successful will depend on the results of the 2013 demonstration trials. The 2012 results as reported in Annex III are not promising but not too much weight should be given to these findings as a result of several problems in conducting the 2012 trials and analysis. Hopefully the 2013 demonstration trials will establish a way forward for the FED

<sup>5</sup> It provides a framework for progressively increasing GoL's annual budgetary allocation to the agriculture sector to a minimum of 10% to ensure sustainable annual 6% growth in compliance with the Maputo Declaration in 2003 to ensure the sector's contribution to economic growth, employment and income generation, food and nutrition security and poverty reduction.

project to more fully assess the ability of the project to help the Ministry of Agriculture begin to achieve the national rice development strategy of improving productivity of existing lowland rice areas. It is important that an emphasis of the FED project be made on expanding coverage to more lowland hectares and developing technologies as well as enterprise development consistent with improving the competitiveness of the existing lowland rice production system relative to rice imports.

Preliminary analysis using the business incubation models being developed by the Enterprise Development Specialist of the FED project suggests that prices of domestically produced rice are not competitive with low quality parboiled rice imports.

## RESEARCH AND EXTENSION POLICY ON POST-HARVEST PROCESSING AND MARKETING

The FED project strategy to work with farmer associations to develop post-harvest processing infrastructure has begun using a parboil approach. The rationale for this approach is that it is value-enhancing from both a milled rice recovery perspective and a nutrition enhancing perspective. It also is a way of generating a domestic supply that will be capable of competing with the primary type of rice imports, which are parboiled. Unfortunately, this project strategy appears to be supply driven, in the sense that no attention has been given to what Liberian rice consumers prefer from their domestic rice supply. For example, the NRDS plan, prefaces the strategy with the following statement of what the MOA believes to be the rice preferences of Liberian consumers.

*"For the majority of Liberians, the term food is generally synonymous to rice in the Liberian context. Rice is eaten as breakfast, lunch and dinner in most Liberian households. No empirical study has been conducted to determine Liberian consumer preferences for rice. Many factors (generally subjective) determine consumers' preferences, including the cost of rice, quality of rice, etc.*

*Consumer preference is generally based on price and cooking characteristics. Consumers prefer non-parboiled, 20 – 25% broken, medium to bold grain type that is non-sticky and swells when cooked. Grain of white colour is more preferred. A wide variety of parboiled rice is available in the market, but it is of second choice to consumers, and it relatively more expensive." (NRDS, p. 9)*

If this is true then one must question the wisdom of the FED project in pursuing the parboiling post-harvest strategy. One suggestion which was made by Wailes in the 2012 trip report was to conduct a consumer preference study to objectively obtain estimates of what characteristics of rice Liberian consumers actually prefer. To my knowledge nothing has been done to address this fundamental question. If the project is to bring a truly sustainable market orientation to the rice value chain, then it would suggest that a study on consumer valuation of rice and rice characteristics should be done sooner than later.

Another observation on the post-harvest approach is that there is some ambiguity with regard to how capable the parboil system can be implemented without great attention to the logistics and coordination of inputs and processing activities (fuel, water, labor, drying and storage of paddy, drying and storage of parboiled, and drying and storage of milled (brown or white rice) and development of market use of by-products (hulls, bran and ash).

Business Incubation models being developed by the FED Enterprise Development officer are a very useful way to evaluate the potential competitiveness not only of the post-harvest production system, but also the farm level output, since of course the paddy rice is the primary input into the post-harvest drying and milling system. Preliminary models have been developed and these will undoubtedly be improved with better data and more experience with actual production and processing activities in 2013. Nevertheless, using these rudimentary models, it was possible to evaluate break-even prices for paddy that would be competitive with imported rice.

Based on a set of reasonable assumptions of milling equipment costs, physical infrastructure, milling rates, labor requirements, and capacity utilization, a break-even price for 50 kg/bag would be \$13. This would provide a competitive price with imported 25% broken parboil rice at a rural market place such as Bong Mines. When this is compared with the World Food Program purchase price of paddy of \$20 per 50 kg, it suggests that currently domestic rice entering into the market is receiving a significant price subsidy relative to imports.

## RECOMMENDATIONS

The rice value chain is critically important for the food and agricultural economy of Liberia. As the NRDS states,

*"Rice is a central to all Government policies and strategies. Rice is the primary staple food of most of Liberia's 3.5 million people. It is produced by 71% of the estimated 404,000 farm families predominantly on the uplands where traditional technology of slash and burn shifting cultivation remains largely unchanged. Annual per capita consumption of rice in Liberia is estimated to be 133kg, one of the highest in Africa. Rice production (milled rice) was estimated at 85,000 metric tons in 2005, 144,000 metric tons in 2007 and in 2008 was estimated to be about 175,000 metric tons. Rice yields of about 0.8 – 0.9 ton/Ha remain far below those possible. More could be done to close this yield gap. Providing key inputs such as quality seed would deliver an immediate productivity boost. The import bill for rice has grown from US\$25 million in 1990 to US\$58.4 million in 2006, US\$70.9 million in 2007 and approximately US\$200 million in 2008 (Ministry of Commerce and Industry, 2009)." (NRDS, pp 7-8)*

On the fundamental question raised for this STTA, what should be the strategy of the FED project with regard to the upland and lowland rice value chains, only a preliminary answer can be given at this point. The upland system appears to be unlikely to generate a return to domestic resources that would make it market competitive. However, it is central to the food security of poor, rural Liberian households. Therefore, the project should seek to support research and outreach activities, including enterprise developments that support improvements in the upland rice production system, but a greater emphasis should be placed on upland rice as part of an integrated cropping system. Greater emphasis of expanding coverage of the area of lowland rice production hectares, improving the productivity of the lowland systems needs to be made without further expansion of the area produced under upland rice systems. However, the project nor the country as a whole have very good data to develop a realistic strategy and

understanding of the constraints facing this value chain<sup>6</sup>. The more obvious concerns affect more than just the rice value chain and include investment in infrastructure (roads, research centers and testing laboratories) and institutional capacity building (national seed policy and regulations, plant protection policies and regulations fertilizers and plant protectants). While there are World Bank funded projects that will focus on rehabilitation of lowland rice development, the FED project needs to focus on expanding coverage on existing lowland areas by improving productivity and developing enterprises for input supply and rice processing that will be sustainable.

A set of specific activities that are recommended are as follows:

1. Develop a detailed study on impacts of pending trade negotiations with ECOWAS and WTO for Liberia rice, using a global rice modeling framework. This research report should address accession, staging and other consequences for rice sector.
2. Develop cost-benefit analysis of improved seed and associated technology package being promoted by FED/USAID, based on 2013 M&E survey data.
3. Develop an integrated farming systems enterprise analysis for constraints (policy, research and extension) and returns for upland rice value chain. Consider other staple crops, vegetables and livestock.
4. Develop an integrated farming systems enterprise analysis for constraints (policy, research and extension) and returns for lowland rice value chain. The focus should be on how to expand the technology support for increasing the number of lowland hectares for rice production. For complementary enterprises, consider vegetables and aquaculture.
5. Develop an economic (policy, technical and logistics constraints) analysis of the post-harvest system, benefits/costs of parboil, conventional (traditional and improved).
6. Conduct a consumer preference survey using experimental auction techniques to estimate willingness to pay for key characteristics of domestic and imported rice. There is no agreement among a set of reports<sup>7</sup> of what the consumer preference is and as this project will invest in developing parboiling as a post harvest strategy, it is incumbent for the project to determine if this is really what Liberian rice consumers prefer. The reason why there is no agreement is that no study of consumer preferences has ever been conducted.
7. Develop a working dialogue with the WAAPP and IADP (World Bank funded projects, technical support from Africa Rice Center) which are also conducting technology package applied research/demonstrations and capacity building (Cyrus Sagybe/WAAPP and Aaron Marshall/AIDP).
8. Develop an involvement with the MOA development of the National Rice Development Strategy, currently working on concept papers (Harry Stays).
  - a. Post-harvest technology.

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<sup>6</sup> The report titled "Developing Liberia's Economic Corridors, Volume Two, Full reports" by the Ministry of Planning and Economic Affairs, 2011, (pp 169-177) provides an interesting but limited DRC analysis on upland and lowland rice with traditional and improved seeds based on two village observations. This analysis would support the change in the FED strategy to expand coverage of improving productivity on lowland rice areas.

<sup>7</sup> See NRDS report p. 9 which suggests non parboiled is preferred to parboiled, also USAID report " GLOBAL FOOD SECURITY RESPONSE WEST AFRICA RICE VALUE CHAIN ANALYSIS" on p. 29 and 30 suggest first that parboiled because that is what is imported is preferred and then next page suggests that round grain (butter rice) is preferred, since that what was imported until China stopped exporting in 2009.

- b. Development of irrigation to improve rice production.
  - c. Improved seed production and distribution.
  - d. Access to financial services for the rice value chain.
  - e. Enhance extension and technology advisory services.
9. Finally an attempt has been made to update the gap analysis that was presented in the 2012 Wailes trip report. A section on progress and achievements has been added.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/Achievements
Increased productivity of rice sector, with a focus on increasing the coverage of lowland rice hectares	Average yield is 1.205/ha ((2008-10) LIPSIS). Average total production is 289.6 thousand MT (2008-10). Compares to pre-war of 1.27 MT/a hand production of 298.6 thou MT Low land productivity reflect dominance (>90%) of upland production system in Liberia.	Production campaign: A systematic and staged development of technology research, demonstration, extension and adoption is needed. This campaign should be developed so that it is viewed as a program package that will have a signal name and series of stages to improve enterprise development among Liberia rice producers. Institutionally this needs to be developed in concert with CARI and the MOA Extension service at the national and county levels of administration. Institutional development of rice producer organizations should begin so that farmers can be developed as leaders, and farm-level enterprises that commercialize their rice production.	The project in 2012 introduced a rice demonstration plot program. In 2013 this program is expanded and a training of trainers program with supporting information on production and post-harvest handling techniques is initiated. It is unclear how much coordination has taken place with CARI and MOA Extension. This needs to be coordinated with the WAAPP and AIDP projects within the National Rice Development Strategy.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/Achievements
<p>Adoption and diffusion of appropriate agricultural production technologies</p>	<p>2010 Liberia Agriculture Statistics reports that major rice production constraints perceived by farmers (in order of importance) are: lack of farming tools, pests, untimely rainfall, lack of seeds, lack of farm labor, lack of extension service/training, plant diseases, poor soil fertility, poor quality seeds, access to land. (Fig. 2.2 p. 8)</p> <p>2011 Liberia Agriculture Statistics reports a 1% increase in yields from 2010 and the average of 2008-10.</p> <p>The first two most important production constraints identified were 1) lack of farming tools, and 2) lack of improved seeds, followed closely by lack of labor and costs of pest controls.</p>	<p>A Liberian Rice Research and Extension conference should be developed and held at the end of the first year, based on:</p> <ol style="list-style-type: none"> <li>1) presentation of previous year's Liberian rice production and status of food security, production constraints and gap analysis,</li> <li>2) experiences of rice sector development of other West African countries,</li> <li>3) Africa Rice and IRRI participation to have them identify contributions they can make to closing research gaps, and</li> <li>4) NGO participants whose agendas include improving food security, technical assistance and enterprise development.</li> </ol> <p>This conference should be held in every subsequent year of the project to</p> <ol style="list-style-type: none"> <li>1) assess development on research, extension, enterprise development and improvement in access to women, enterprise development including financing, business training, and investment</li> <li>2) to present and discuss research and extension plans for the subsequent year, and</li> <li>3) to promote awareness of the project to local, national and international stakeholders.</li> </ol> <p>Financial support for the national rice conference should be sought from Bioscience companies, International organizations (World Bank, FAO, IRRI, etc.), and NGOs. Develop with extension, local and county level rice production meetings with farmers to discuss production problems and constraints. These meeting should be held during the dry season of each year to reflect on problems of the previous year and introduce new production information for producers for the upcoming production season.</p>	<p>No response to this recommendation has been made. The project should realize that there are a number of organizations with funding and a mission to help improve the rice sectors in West Africa. The project needs to tap into this expertise and coordinate with MOA.</p>

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/ Achievements
Production using higher yielding improved varieties	<p>2010 Liberia Agriculture Statistics indicates, 91% of rice producing households planted "traditional" varieties, only 5% planted LAC 23 and 1% planted Nerica varieties. Standard practice however is that farmers will sow several varieties at the same time as a risk mitigating strategy to ensure that they will obtain some production. Commingled seed varieties present significant problems for application of best management practices such as optimal timing of fertilizer application, pest control, timing of harvest, and milling quality.</p> <p>2011 Liberia Agriculture Statistics reports that 94.1% of households planted traditional varieties, lower than in 2010.</p>	<p>Support research varietal trial screening and development for selections that are adapted to Liberian rice production environments. Ensure that currently adapted germplasm for lowland rice (Suakoko 8, WITA, Nerica, etc) and for upland (LAC 23 and Nericas) are being used aggressively in rice breeding efforts at Africa Rice, IRRI, and other national experiment stations. Develop a network of "leading" farmers in as many rural communities as possible to enroll in producing and testing improved varieties within the context of the national rice campaign demonstration plots. All participants would be recognized at the national rice conference and a set of annual awards will be developed to be given to Top Farmers (highest yield, most innovative technology award, etc.). Support rice seed producers in training to understand new Liberian seed policy and regulatory framework to supply certified seed. On-farm demonstration sites should be followed up with a development of a national directory of rice seed suppliers by locality in the project target counties. Seed producers should be given technical and business management training regarding appropriate seed handling, labeling, packaging (size and type), accessing and pricing to wholesale and retail (local farm) markets.</p>	<p>The FED project will help to diffuse and use improved varieties in 2013. These demonstration plots are taking the rice sector in the right direction. This activity will develop a network of leading farmers and hopefully create a system to recognize "Top Producers". The MOPEA study on Developing Liberia's Economic Corridors fully support the advantage of expanding the planting of improved varieties.</p>

<b>Updated Liberia Rice Sector Gap Analysis - FED Project</b>			
<b>Future State</b>	<b>Current Situation</b>	<b>Actions/Proposals</b>	<b>Progress/Achievements</b>
Production using best management practices of fertilizer and cultural techniques	Current fertilizer use is limited. No soils test laboratory exists in the country. No experimental fertilizer response studies for soils and improved varieties.	Support research at CARI on nutrient and fertilizer application experimental trials. Engage support of private fertilizer supply companies to sponsor research and farm level demonstration trials. Only with experimental trials on locally adapted varieties and soils can the development of fertilizer supply firms and merchandizers be justified. Develop support of a soils testing laboratory and support training of extension workers to assist farmers in collecting and evaluating fertilizer requirements. Current fertilizer pricing for producers needs to be evaluated such that pricing reflects nutrient value added based on research trials.	There is no clear evidence that experimental trials are being developed on fertilizer and cultural techniques. Demonstration trials are recommended to use a fixed amount but since there is no soil testing lab in situ, it is difficult to ensure that the best use of fertilizers will be applied.

<b>Updated Liberia Rice Sector Gap Analysis - FED Project</b>			
<b>Future State</b>	<b>Current Situation</b>	<b>Actions/Proposals</b>	<b>Progress/Achievements</b>
Production using best management practices of integrated pest control	2010 Liberia Agriculture Statistics reports that by percent of households reporting the most prevalent pest (in order of importance) are: ground hogs, birds, termites, weeds, and insects.	Support research on best management practices to control pests. Trials of frightening and scaring devices and techniques, physical barriers, and chemical repellents should be supported. Develop businesses that produce pest control technologies, such as live traps, bird disturbance devices, herbicide treatments, and integrated insect management. A report of rice pest management in neighboring West African nations should be developed so that lessons learned can be extended in Liberia. Collaboration with wildlife and birding NGOs should be pursued to identify pest species and understand appropriate control methods. Similarly, weed scientists and entomologists should be consulted to assess the plant and insect species that are most damaging pests for rice and obtain advice on best management control for small farm plots.	Blast is a serious rice plant disease but there is no recommendation yet, except to identify varieties with low susceptibility. Maintaining a blast nursery to test for varietal susceptibility should be pursued.

<b>Updated Liberia Rice Sector Gap Analysis - FED Project</b>			
<b>Future State</b>	<b>Current Situation</b>	<b>Actions/Proposals</b>	<b>Progress/Achievements</b>
Production using best management mechanization with respect to labor supply/demand	Current uptake of rice farm labor into mining and perennial crops production is posing a significant labor supply constraint on rice production. As a subsistence crop women and children are often left to manage the production of rice in Liberia. There has been significant rural population migration to Monrovia and major cities in counties creating labor scarcity in rice production areas.	Mechanization policy should be carefully developed for the rice sector. Farmers indicated that a major production constraint was lack of tools, for both production and harvest. Since this project will focus on lowland rice production and rehabilitation, there is an important need to assess the appropriate types, sizes, ownership, supply and financing of machinery to expand and reclaim lowland areas. Given the important role of women in rice production, addressing obstacles such as access to finance and training for mechanization must be paramount. Production and merchandising of farm tools and machinery provides an important area for developing a significant number SMEs to participate in this critical component of the rice value chain.	The project has invested in tillers for lowland rice tillage. It will be important to see that this machinery to distributed to the best uses, with training for repair and maintenance. The FED project has invested in the development of rice huller equipment, which would result in brown rice, which would still need to be milled, or a consumer market for brown rice developed.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/Achievements
Production using best management practices for irrigation and water control for lowland varieties	Less than 10% of Liberia rice production is swamp/lowland (irrigated). Irrigation infrastructure is in poor condition. Costs of reclaiming lowland rice production areas is expensive (\$300-\$500 per acre)	Land and water development for lowland rice is central to improving productivity of Liberia's rice sector. Most land under lowland rice went out of production during the civil strife. Program 4 of LASIP intends to invest in expansion of irrigable land. It has been estimated that nearly 10,000 ha need to be rehabilitated per year over the next five years to be able to begin to meet self-sufficiency rice production goals of the National Rice Strategy. Policy constraints that the project must address and monitor include improvement in land tenure and titles for producers who are expected to move onto rehabilitated lowland rice production areas, investment and financing constraints that must be removed to achieve expansion of irrigable areas. Coordination with companies who have been allocated rice production concessions on lowland rice in order to develop adequate input and product market infrastructure, including machinery and equipment suppliers, seeds, fertilizers, and other purchased input enterprises as well as post-harvest rice drying, storage and milling.	The project needs to conduct an analysis of the costs of lowland rice rehabilitation costs. The National Rice Development Strategy relies heavily on bringing into production new areas of lowland irrigated rice systems. This investment may not be warranted if lowland rice yields cannot achieve market competitive levels.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/ Achievements
Production using best management practices of post-harvest drying and storage of paddy	The dominant method of drying rice is ground or tarpaulin spreading using sunlight. Paddy is currently stored in 50kg bags in farm households.	Support research activities on post-harvest management of paddy rice. Identify improved methods of rice drying and storage to minimize post-harvest losses and maintain quality of paddy prior to milling. Enable SME to assess feasibility of producing and merchandising improved rice drying and storage equipment. Promote development of techniques and equipment to manage post-harvest losses from pests (rodents, etc.) which should also be pursued by assisting SMEs to produce and market storage and drying infrastructure to minimize damage from pests.	A significant attention in 2013 has been the development of a parboiling post harvest management systems for farmer associations. Parboiled rice is the imported competition and therefore it makes sense to develop this for the domestic market supply. Parboiling techniques will rely upon traditional Indian/Pakistani methods of batch processing. It is unclear of the logistics of inputs and outputs for this system are fully understood and developed by the farmer associations at

**Updated Liberia Rice Sector Gap Analysis - FED Project**

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Achievements**

this point. It should be expected that this processing technique should be introduced slowly to allow for farmer associations to develop expertise needed to be successful in a sustainable way.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/ Achievements
<p>Transportation of paddy to mill sites/markets based on best logistical and integrated markets</p>	<p>Paddy is either home milled using mortar or taken to local market where it is tow milled by a single pass huller (Engelberg-type). With only limited commercial rice milling, currently the miller drives to known farms or farm groups where paddy is purchased directly from the farmer.</p>	<p>Investment in roads and monitoring policies which are constraints to transportation infrastructure must be addressed for surplus household production to reach local and urban markets. Expansion in the number of grain merchants will encourage a competitive procurement system for paddy rice and minimize opportunistic and predatory pricing of farm to wholesale marketing margins.</p>	<p>Poor roads continue to be a major marketing constraint both for inputs and domestic rice marketing. Transportation will be a major component of marketing margins for domestically produced rice to compete in regional and Monrovia urban markets. Developing economies of size in production and coordination of rice for these markets will be necessary to overcome the high transportation costs. Price differences, even for short distances, between Kakata and Bong Mines suggest approximately a 10%</p>

**Updated Liberia Rice Sector Gap Analysis - FED Project**

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Achievements**

price differential.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/ Achievements
<p>Processing of rice from paddy to milled using best management practices with respect to milling quality (out-turn), nutrition, storage, and access to markets.</p>	<p>Milling quality of Liberian rice is poor as a result of primitive milling methods. Even best mills produce high percentages of broken. Many causes include commingling of different varieties, different maturation and drying of batches being milled, lack of investment in milling equipment, grading, sorting, hulling and polishing machines. The upside is that most domestic rice is only lightly milled with a high percent of bran (brown rice), which is considerably more nutritious compared to white rice.</p>	<p>The project should encourage an expansion in the number of rice millers and work to remove financial and investment barriers that these rice processors encounter, including business registration, excessive food safety regulations and limitations on access to wholesale and retail markets. Nutrition policy analysis should consider how quickly improving the rice milling sector should proceed as poorly milled rice in general is more nutritious than well-milled white rice. Until the Liberian diet becomes less dependent on rice as a staple food, the development of a high quality milling sector producing well-milled rice should be approached with caution.</p>	<p>The project is developing the farmer association as potential rice milling operators with the parboiling production system. Parboiling is a good strategic investment to compete with imports and it improves the nutritive value of rice and improves the milling quality by reducing the percent of broken kernels.</p>
<p>Production and distribution to local rural markets of domestic rice</p>	<p>The linkage from farm to local rural market is weak. Surplus rice is marketed but current production levels require imported rice at remote local rural markets.</p>	<p>The project should identify bottlenecks including transportation, storage, regulatory food policies that constrain the movement of domestic rice into competition with imported rice.</p>	<p>A value chain assessment of costs and prices need to be completed for each county included in the project. This should be done for each project farmer</p>

<b>Updated Liberia Rice Sector Gap Analysis - FED Project</b>			
<b>Future State</b>	<b>Current Situation</b>	<b>Actions/Proposals</b>	<b>Progress/Achievements</b>
			association.
Production of domestic branded rice products for distribution to urban areas	Currently there is one Liberian-branded rice product found in retail stores--Fabrar. Production is very limited.	Branding and packaging of domestic rice can help to promote markets and improve visibility of Liberian rice production. Barriers to advertising, promotion and brand development should be addressed by the project to enhance the profitability and competitiveness of wholesale and retail suppliers of domestically supplied rice.	Producer associations should over time be encouraged to engage in location branding of their marketed rice.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/ Achievements
Increase profitability of the rice sector	<p>Baseline cost estimates of rice production are lacking. While LIPSIS has developed a regional rice price reporting system, without estimates of costs, measuring current profitability of domestic rice production is difficult. The major cost component is labor which for yield levels only slightly above 1 MT per ha, returns to rice production are low. Cost of imports as they flow up country to local and regional markets provide a useful shadow price for local production. What is most clear is that current production is primarily for household self-sufficiency in the face of undeveloped market channels. Systematic development of research based technology innovations, significant investment in rehabilitation of lowland rice production areas, commitment to test alternative farm-level innovations through demonstration</p>	<p>The project must develop credible baseline production cost estimates for upland and lowland rice production systems. This will allow the development of domestic resource cost (DRC) estimates to assess improvement in the competitiveness of the rice sector over the life of the project. Profitability of the rice sector can be attained through the development of a commercial business infrastructure for delivery of new technologies, improved seeds, improved quality of rice products, and expanded access to rural and urban markets. However, if the research and extension components are not developed simultaneously, enabling the business environment will be futile. Therefore, consistent support and interaction with agricultural research and extension will be critical to the success of this project.</p>	<p>The analytical basis for developing costs of production for the upland and lowland rice production systems was not achieved with the 2012 M&amp;E assessment. It appears that the 2013 data collection and larger sample size will provide the needed estimates that are necessary to develop more clear recommendations on the direction of the FED project to develop both upland and lowland rice production systems and what can be expected over the life of the project.</p>

**Updated Liberia Rice Sector Gap Analysis - FED Project**

**Future State**

**Current Situation**

**Actions/Proposals**

**Progress/  
Achievements**

plots.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/ Achievements
Stimulate private enterprise growth and investment	While a clear MOA policy exists against the distribution of free inputs, the current situation is that many NGOs are providing free seeds, hand tools, and other inputs. Private enterprise growth and investment cannot develop under these circumstances.	The project must coordinate with MOA and donor agencies/NGOs to transition immediately from free distribution to market based supply of inputs. Further, unscrupulous marketing of farm inputs without adequate research recommendations and regulatory oversight must also be addressed including, enforcement of seed policies for seed purity, guaranteed germination, research-based applications of fertilizers, pest management and other output enhancing inputs. The project should identify and work with input supply companies and identify local businesses that need training to supply and provide advice on input purchases. In addition to establishing appropriate input recommendations through research trials and extension efforts, the project must address financial constraints and business training for local input suppliers.	The FED project has participated with the Ministry of Commerce and Industry to focus on small and medium size enterprise (SMSE) development. The FED project has put into place a specialist who will help to establish SMSE firms in the rice value chain.

## Updated Liberia Rice Sector Gap Analysis - FED Project

Future State	Current Situation	Actions/Proposals	Progress/Achievements
<p>Enabling the policy environment for private sector growth in the rice value chain</p>	<p>The National Rice Development Strategy is designed to work within the context of the Poverty Reduction Strategy and the Liberia Agricultural Sector Investment Program (LASIP). The primary policy goal is to reduce dependency on imports of rice (currently over 60% of supply) and to increase incomes of small farmers.</p>	<p>The project must address the lack of basic economic and technical information to evaluate the ability of domestic rice varieties to replace imported rice. The import market has become much more of a parboil rice market. This change suggests that world market prices, which differ significantly by type and degree of processing, largely determine the type and source of rice being imported into Liberia. Rice consumption by Liberians is price sensitive but it is unclear what type and method of processing is truly preferred by Liberian consumers. The project should conduct a study of rice preferences using experimental auctions to determine willingness to pay for rice type, degree of processing, etc. so as to provide guidance to the varietal selection and post harvest investment strategies for processing and marketing. Other activities to ensure a policy environment favorable to private sector growth include: 1) Assess impact of infrastructure constraints on lowland rice production areas, 2) Evaluate implementation of the national seed policy and regulatory framework for SMSE participation in certified rice seed production, 3) Evaluate the domestic resource costs of Liberia rice production under current and an improved (attainable) production environment. , understanding of the issues that affect the performance of Liberia's rice sector.</p>	<p>The FED project has made good progress in developing business enterprise budgets for the rice value chain. These budgets need to be validated and used to educate new enterprises seeking to participate in the value chain and also to evaluate the competitiveness, and productivity gains needed to compete with the imported rice supplies.</p>

## **ANNEX I. RICE VALUE CHAIN POLICY ENVIRONMENT ASSESSMENT - SOW**

### **LIBERIA FOOD AND ENTERPRISE DEVELOPMENT PROGRAM (FED) DRAFT SCOPE OF WORK**

**Title:** Rice Policy Advisor

**Location:** Monrovia, Liberia (with field travel as required)

**Period of Performance:** Estimated project period – March to June 2013.

**LOE Required:** Anticipated 2 ½ weeks in Liberia

**Consultant:** Dr. Eric Wailes

#### **BACKGROUND:**

FED is a USAID-funded project that aims to increase productivity, profitability, and access within the rice, cassava, vegetable, and goat value chains; improve nutrition; and strengthen food security. FED is focused on four priority counties (Grand Bassa, Bong, Nimba and Lofa) and two secondary counties, (Magribi and Montserrado). FED works with partners throughout the value chain, improving productivity, strengthening access to inputs and services, and creating market linkages, with a particular focus on women and youth. The FED project is implemented across the following component objectives:

- Component 1: Increase agricultural productivity and profitability and improve human nutrition;
- Component 2: Stimulate private enterprise growth and investment; and
- Component 3: Build local technical and managerial human resources to sustain and expand accomplishments achieved under objectives one and two.

This short-term technical assignment focuses on Component Two, task 2.1 and will contribute to Component One Task 1:

- Component 1: Increase agricultural productivity and profitability and improve human nutrition;
  - Task 1. Value chain development.
    - Sub-task 1.1 Identifying locations, stakeholders and specific strategies
    - Sub-task 1.5 Increased Production and Profitability of Quality Rice in Liberia
- Component 2: Stimulate private enterprise growth and investment:
  - Task 2.1 Enabling the Policy Environment for Private Sector Growth

#### **OBJECTIVES:**

During the STTA assignment, the Rice Policy Expert will participate in a FED team coordinated by the FED COP to work closely with the Ministries of Agriculture and Commerce and USAID/Liberia to assist in the development of policy interventions for the rice value chain. He will define training plans and targeted technical assistance to achieve specific policy objectives.

The Rice Policy Advisor will follow up on the Liberia Rice Sector Gap Analysis developed previously during a STTA and further assess policies and identify policy implementation challenges by consulting County and District officials of the target counties, representatives of the relevant Ministries, and major donors in Liberia (including USAID funded projects) and by learning from farmers and entrepreneurs about the impact of current policies on the rice value chain.

Specific policies to be reviewed include, but are not limited to:

- 1) A unified approach to subsidies, import and export policies and any infrastructure support to the rice sector;
- 2) Implementation of the national seed policy and the certified rice seed program;
- 3) Policy impacting the development of input supply networks (seeds, fertilizers, pest management) and post-harvest rice drying, transportation, storage and milling infrastructure and networks; and
- 4) Research and extension policy to ensure that best practices are made available to rice change agents including farmers, researchers, extension agents and entrepreneurs.
- 5) The Government of Liberia's current position on ECOWAS rice pricing policy/protocol and the impact on domestic rice markets, farmers, and production

#### **DELIVERABLES:**

- Report that describes current policies on enterprise and agricultural development in the rice value chain;
- A report that assesses current policies and suggests new or revised policies to promote agriculture sector growth and food security in Liberia as it pertains to the rice value chain;
- Propose future activities that may be required, including trainings, workshops, and field supervision to develop successful and rigorous implementation of any policies selected by the GoL;
- Report on upland rice farming practices and other major crops that are included / integrated with upland rice, it's impact on smallholder farming and households, and,
- A draft trip report with meeting notes and recommendations is to be submitted to the DAI/FED Project Office before Dr. Wailes's departure. A final trip report will be submitted within 7 days of his departure to address questions and comments on the draft trip report.

**Reporting:** The Rice Policy Advisor will report in the field to the FED Chief of Party, or his designee as well as the LSU AgCenter's PI.

## **ANNEX II. ACTIVITIES AND MEETING NOTES**

Trip Notes - Wailes, April 1 - 17, 2013

April 1, 2013

8:30 a.m. Met with DCOP Agnes Luz to review STTA SOW.

9:00 a.m. Attended staff meeting

10:00 a.m. Arranged 2:30 p.m. meeting with Patrick Farnga and Gonyeyee Bartuah (Rice Value Chain Manager and Rice Officer, respectively) to discuss rice technology demonstration pilot project.

11:00 a.m. Was provided and reviewed the *Baseline Survey for USAID/FED Program, Liberia* by Marit Woods (M&E). This report provides very basic information about the FED project objectives, survey methodology (sample size of 944 households), demographics, agricultural and livestock household activities, household dwelling characteristics, lessons observed and recommendations. The report is strictly descriptive with no analytical cross-tabs except by county.

1:00 p.m. Was provided and reviewed the 2012 Rice Demonstration Pilot Program report.

2:30 p.m. Met with Patrick Farnga and Gonyeyee Bartuah regarding the 2013 rice demonstration pilot program. This program will be county implemented for Bong, Grand Bassa, Lofa, and Nimba counties. Each county will have two FED supervisors who will work with technicians to provide different levels of support and advice for three groups of farmer association categories. Category A will receive the highest level of support with 1 technician assigned to 3 farmer associations. These technicians will be funded by FED and IFDC (International Fertilizer Development Center). Category B farmers will be assisted by technicians supplied by NGOs. Category 3 will be advised by Lead Farmers (trained by FED), who are selected by association members. Data will be collected systematically by M&E on production activities, yields and post-harvest activities. A control group of farmers who are not receiving any assistance by the FED project treatment will be included in the data collection.

April 2, 2013

9:00 a.m. Met with Melanie Bittle, to discuss itinerary of people to meet and documents to obtain. Meetings were set for April 3 with MOCI, Mr. Steve Zaizay (Senior Price Analyst) and Mr. Steve Flahn-Paye (Director of Price Analysis and Markets) and with Dr. Robert Chakanda, international seed expert (formerly with FAO seconded to CARI). A call was made to Peter Kun, who is responsible for the National Agriculture Statistics Yearbook, and he agreed to generate access to 2011 Agriculture Statistics Yearbook. We agreed to call tomorrow to Mariah Quaye of the Price Statistics Division at LISGIS which will result in update of regional price set. Meeting with USAID was developed for tomorrow afternoon, April 3.

4:00 p.m. meeting with Dr. Moses Zinnah, MOA to discuss the MOCI/FED SMSE conference and the agriculture breakout session to focus on developments towards enterprise enabling reforms (seed certification, plant protection approvals, and livestock pharmaceuticals). We also discussed the National Rice Development Strategy (NRDS) and development of 5 concept papers under the guidance of Harry Stays (Wonyene), Director of Monitoring & Evaluating, MOA tel: 086573318. We also discussed the World Bank/Africa Rice Center projects, Agriculture Investment and Development Program (AIDP) and the West Africa Agriculture Productivity

Project (WAAPP) to create rice development hubs in Bong Mines and Foya, Lofa County and develop human resource capacity. He was unsure of how these projects were going to be implemented but we should check with Dr. Subah, Deputy Minister, Technical Programs, MOA. We discussed road infrastructure and the need for coordination among donors, and finally, a large discussion focused on the need to discuss and encourage the Minister of Agriculture to move forward on institutional development and legislation to establish seed certification processes, plant protection regulations, and animal pharmaceutical registrations. There is apparently, internal to the MOA, resistance to moving on these critical issues. It was proposed that USAID (Joe Hirsch) as a member of the donor coordinating committee with the MOA should play a lead role in encouraging the Minister to move on these reforms.

April 3, 2013

9 a.m. meeting with Steve Flahn-Paye and Steven Zaizay at MOCI, Price and Market Analysis Division. The primary purpose was to request 2012 rice import trade data by shipment (origin, exporter company, trading company, rice type, label, price (fob and cif) and date of arrival); 2012 annual summary by origin and rice type; 2011 and 2012 monthly rice stocks. Steve Flahn-Paye reviewed the current set of rice import trading companies operating in Liberia (n=7 with 5 mostly active: S.W.A.T (Ibrahim Izedine), Mila, UCI (Anwar Izedine), K&K (Kadour&Kadour), Fouta Brothers (Guinean), Abranata & Son (Sidiki Touray), Harmony (Siaka Touray) and Fuaoni. Rice trade is dominated now by Indian parboil. To some degree, US rice is coming in under Food for Peace monetization. Currently there has been no change in rice import tariffs, being kept at zero and the rice stabilization fund (\$1/ 50 kg bag) is not being collected. Stocks and import shipments are being managed by major traders, with collateral management with the major export houses such as Dreyfus, Olam and Nidera.

11 a.m. meeting with Robert Chakanda (rchakanda@gmail.com) (tel: 0880777716). Robert formerly worked with FAO as a rice breeder, seconded to CARI. After difficulties with CARI management Robert was moved back to Monrovia. No longer with FAO, he is working with FarmHouse a Liberian Seed and Produce Company (rice seeds and vegetable peri-urban farm aggregator. FarmHouse has two outgrowers--Arise and Shine (Harriet Larway in Bong County) and AIIC (Mohammad Kamara) in Lofa. FarmHouse is also multiplying foundation seed (rice and vegetables) from CARI on 10 acres at a farm near Suakoko. They are also producing vegetable seeds on a farm of 1 acre near the University of Liberia Fendell campus with hybrid varieties from Netherlands. Finally, they are aggregating produce from 20 peri-urban farms in the greater Monrovia area that are sold either at roadside or contracting with grocery stores. They are experimenting with different production scheduling systems and contracting systems. I notified Dermot Cassidy, who is working on the peri-urban vegetable value chain that Robert may be an interesting and useful contact.

3:30 p.m. meeting with USAID/Agriculture - (Joe Hirsch, Ken Hasson, Surendra Bhatta, Joe-Hoover Gbadyu, and John Ellis). The primary concern is with what to do with upland and lowland rice within the FED project. Is a more balanced approach but with different objectives, upland for the integrated food production/consumption subsistence/food security objective and lowland production for commercial/integrated with vegetables and aquaculture production objective? How should FED and USAID address this with respect to the global rice market context, the environmental context, the Liberian food security context and small-holder engagement? There was an expression that how FED moves forward to most effectively address

the fundamental questions of poverty, nutrition and health may not be best served by using the original value chain approach alone. Obviously crops and livestock value chains are connected through substitution and complementarities that require the efforts to be assessed also through an integrated farming systems framework. Inertia to develop institutional reforms (land titling, seed certification, plant protection regulation and inspection, and other regulatory mechanisms) is a serious bottleneck to achieve gains from new technologies and returns to the private sector investments in enterprise developments and to public investments in infrastructure. At the same time, infrastructure and institutions alone cannot deliver on food security and commercialization unless there are gains in productivities from science and technology. We ended with a discussion for the need of a policy brief which can raise these questions and provide some empirical analysis to frame where there are trade-offs and a perspective of when progress can be achieved. Development of such a policy brief will be in my recommendations.

April 4, 2013

9:00 Traveled to LISGIS to obtain statistical yearbook and rice tables from Peter Kun and hopefully to get updated price data from Mariah Quaye. Neither had arrived at the office so we traveled out to MOA offices to meet with Harry Stays (Wonyene), Director of M&E, MOA. We asked him to explain the NRDS strategy as it pertains to current and projected rice policy within the MOA. The strategy project is being funded by the Coordinated African Rice Development (CARD) project funded by JICA and FAO. They are using a "weekly" approach to making progress. The first working week was held April 21-25, 2012 to conduct and report a gap analysis using SIEM (Subsector-Intervention-Elements-Matrix). The major elements of the gap analysis are: 1. Improving land and water management, 2. Increasing availability of and accessibility to inputs, 3. Enhancing and improving post-harvest quality, 4. Increasing access to markets, 5. Institutional capacity building, and 6. Increasing mechanization; and these gaps are delineated for implementation through 12 matrix element interventions.

The second working week was held January 14-18, 2013 for the purpose of developing and merging interventions to something that is feasible. The 12 matrix elements were reduced to 5 components. Then on March 12-15, JICA and FAO provided experts from the Philippines and Vietnam to help put flesh on the 5 proposals. A major topic for discussion was the integration of lowland rice with aquaculture. The major push in the overall strategy is to expand and rehabilitate lowland areas by 88,000 ha and improve productivity levels. The approach to incorporate small holders in the lowland rice production is to develop a concessionaire/nuclear farmer model and help to organize small holder operations around this larger or lead operation, using the model of the rubber large estate and small holder model. This framework is a work in progress.

Harry introduced me to Cyrus Sagybe who is the National Project Coordinator in the Program Management Unit (PMU) of the MOA, charged with coordinating West Africa Agriculture Productivity Project (WAAPP) activities between the World Bank and MOA. Cyrus indicated that Aaron Marshall is coordinating the rice component of the Agriculture and Investment Development Program (AIDP) funded by the World Bank and being implemented by MOA with

assistance from the African Rice Center. The current activities of Africa Rice, the group currently implementing the rice component of the World Bank's funded Agriculture and Infrastructure Development Program (AIDP) are expected to do same for the West Africa Agricultural Productivity Program (WAAPP) that was recently launched in Monrovia, including; enhancing food security in vulnerable communities of Liberia, in the face of a global price crisis. This would be supported by the following specific objectives to: 1) to make seeds and good agricultural and post-harvest practices available to farmers to increase rice production, 2) to improve rice quality and reduce imports; 3) to develop a critical mass of trained scientists, extension workers and community seed producers (with an emphasis on rural youth and women), and 4) establish a policy framework for the development of rice seed systems that assures seed security in Liberia. Cyrus promised to provide documents regarding the WAAPP project (See Trip Report Annex 1).

11:45 a.m. Visited with the Price and Market Analysis group at MOCI to collect rice trade and stocks data. Based on my request, they are entering this data into the computer and should have it emailed to me by tomorrow. Katie Fahrland (MOF technical advisor on trade liberalization, Delloite Consulting LLP, Liberia Trade Policy and Customs Project, tel: 076 939 755, email: [fahrland@gmail.com](mailto:fahrland@gmail.com) ) and John Spray (economist at MOCI/WTO advisor: tel: 0888062117, email: [john.spray.moci@gmail.com](mailto:john.spray.moci@gmail.com)) met me for lunch. John agreed to provide customs data on rice and cassava trade. Katie agreed to provide documents on tariffs and ECOWAS regional trade integration (See Trip Report Annex 2 for policy brief on ECOWAS Trade Liberalization Scheme). Both followed through later in the afternoon. Katie indicated that William Buku, who is Assistant Commissioner for Operational Policy & International Relations in the Bureau of Customs & Excise is coordinating Liberia's entry into the Common External Tariff (CET) of ECOWAS. His email is [williambuku@yahoo.com](mailto:williambuku@yahoo.com) and his phone is 0886 520 392. Mr Buku gave a presentation Friday April 5 on the status of ECOWAS CET and Liberia's negotiated approach. (See Trip Report Annex 3)

2:00 Attended an exit seminar by Dr. Edward Rhodes, soil scientist from Sierra Leone. Excellent presentation with useful recommendations for developing technical support from FED for soil fertility analysis and management.

April 5, 2013

8:00 a.m. Drove to Kakata and Bong Mines with Melanie Bittle and Patrick Farnga (we were joined by WAAPP M&E officer, Edward Barloh, PMU/MOA, Tel: 0886524003 email: [azariah\\_eduardo@yahoo.com](mailto:azariah_eduardo@yahoo.com) We stopped at Arjay Farms (Josephine Francis) on the way and visited with farm manager, David Nellon email: [d.nellon@yahoo.com](mailto:d.nellon@yahoo.com) David gave a tour of the farm operation, including seed drying shed, processing equipment, and seed rice storage. They had abundant supplies of Nerica L 19, Nerica 14, Suakoko 8, LAC 23 (red), Nerica 2 and Nerica 4 (See Trip Report Annex 4). In Kakata, we stopped to get retail rice price data and then proceeded on to Bong Mines. There we met with leaders of a 500 member farmer association who will work with FED on demonstration field trials (21 acres of their 300 total acres) and use the parboiling post-harvest process and milling approach recommended by Dr. Vellanki. The rice cooperative was started in 2002 and charged LD 25 per month but then dissolved. Originally they sold together but now sell independently. They indicated that their choice of improved lowland rice varieties were Suakoko 8 (40%), WITA 4 (30%), and Nerica L 19 (30%). The dominant upland variety is LAC 23 (red). Some of the farmers in the area sell improved seed

varieties (Nerica 2, 7, 8, and L19) back to Greenstar for 75 LD/kg (1 USD/kg). They were asked to identify their biggest problem in rice production. Number 1 was lack of technical advice. Second were pests (birds and cutworms). They also noted that the price of petrol LD 400/liter compared to Kakata LD 330 disadvantaged them to sell their surplus rice at a competitive price. For the upland inter-cropping they produce pepper, plantain, groundnuts, penesee, okra, pumpkin and watermelon. (See Trip report Annex 5).

No local rice was available at Bong Mines village market. We asked the price and were told when available it was LD 20 per cup. We estimated 2 cups/kg, or LD 40/kg (equal to LD 1,000 per 25 kg bag). This is equivalent to the 100% broken rice from India and Pakistan at Kakata (Table 1).

Table 1. Retail prices LD/25kg bag of rice at Kakata and Bong Mines. April 4, 2013.

Market	India 5% broken parboil	India 5% broken parboil fine	Vietnam 25% white rice	India 25% brokens parboil	India 100% brokens	Pakistan 100% brokens
Kakata	1,250	1,350	950	na	1,000	1,001
Bong Mines	1,350	na	1,150	1,100	na	na
Red Light (Monrovia)					1,000	

Source: personal interview with rice retailers.

April 6, 2013.

Reviewed documents at office.

April 8, 2013

Made requests again from LISGIS for the 2011 Agricultural Statistics Yearbook, and to MOCI for the 2012 rice trade data.

Reviewed policy baseline assessment by Toland and trade data and presentation by William Butu from Customs on ECOWAS and the CET.

Met with Gonyeyee Bartuah, and M&E Officers William Massaboi and Joseph Subah-Morris and Aaron Kokolie (M&E coordinator for Bong County), to discuss and review the first draft of the farmer survey questionnaire for the 2013 rice production year. The key will be to obtain better information on upland and lowland rice production technologies and practices, costs to compare between the two and with a control of non-FED supported farmers. I offered suggested changes and discussed the questionnaire with the group.

April 9, 2013

Worked on baseline survey data to identify factors (other crops and livestock) associated with rice farming in Liberia (See main report for results).

April 10, 2013

Went to LISGIS and received an electronic copy of 2011 Agricultural Yearbook from Peter Kun (See Trip Report Annex 6). Visited with Mariah Quaye of Price Reporting section and requested more recent data which she agreed to provide. Also stopped at MOCI and got the detailed 2011 and 2012 shipment data files on rice imports from Market and Price Analysis section (See Trip Report Annex 7).

Was asked by Melanie Bittle to review the Business Incubation Rice Post Harvest spreadsheets that she was developing. Using her spreadsheets, I developed a framework to determine breakeven paddy price for the parboil mill to meet breakeven costs for Bong Mines, as an example.

April 11, 2013

Worked on MOCI rice export data, analysis by year, month, origin, prices, and trader share.

April 12, 2013

Reviewed NAGA report, WAAPP report and 2011 Agricultural Yearbook.

April 13, 2013

I met with Robert (Bob) Resseguie, M&E Manager. We discussed the rice questionnaire and he clarified that both upland and lowland rice producer associations would be surveyed. FED is apparently only providing intervention for either upland or lowland technologies on rice to each farmer association group. I suggested that there was perhaps merit asking the farmers also about their upland or lowland rice production practices on which they were not receiving any direct FED support, as a way to identify if there was any spillover effect. Bob suggested that he might take this into account.

Completed analysis of rice import trade data.

April 15, 2013

Attended FED meeting, prepared for exit presentation, attended exit presentation by Jim Correll.

April 16, 2013

Completed preparation for exit presentation, met with DCOP Agnes Luz then gave the exit presentation. Discussed upland rice cropping systems and road conditions with Franklin Henries, FED cassava value chain specialist (see Trip report Annex 8 for photos)

Began writing the policy environment report (PEA).

April 17, 2013

Continued to work on the PEA report. Departed for the airport at 2:30 p.m.

## ANNEX III. RICE PRODUCTIVITY ANALYSIS

(PREPARED AND PROVIDED BY FED M&E.)

### 2012 RICE DEMONSTRATION PLOTS PROGRAM

In 2012, the first year of FED's operations a total of 27 demonstration plots for rice were established in the four primary counties as indicated below

County	Lowland rice	Upland rice	Total plots
Bong	5	0	5
Grand Bassa	5	0	5
Nimba	6	2	7
Lofa	7	2	9
<b>Total</b>	<b>23</b>	<b>4</b>	<b>27</b>

Most of the demonstration sites are for lowland rice although there are two upland rice demonstration sites for upland rice in Nimba and Lofa counties.

Each lowland site has an area of around 0.6 ha (1.5 ac) divided into 15 plots of around 20m by 20m, while the upland sites are larger at 1.20 ha (3 ac). Altogether there are 405 plots.

At each lowland and upland site three improved rice varieties are being trialed with two planting methods: lowland sites transplanted seedlings in uniform rows, and randomly planted; upland sites dibbing into the soil and broadcast seeding. At the lowland sites fertilizer – NPK 15-15-15 is applied at a rate of 123kg/ha (50 kg/ac), while for upland sites the rate is reduced to 62kg/ha (25kg/ac). No pesticides are applied.

Lowland rice field are banded to maintain the paddy fields in a flooded with water provided from streams and rainfall. Currently no irrigation pumping is done. The rice is transplanted July/August and harvested after 90 days in October/November. Weeding is done one or two times during the growing season. Upland sites are dependent on rainfall.

In the 2013 rice production season it is proposed to increase the number of lowland rice demonstration sites to 10 per county (40 total) and to have four upland site per county (total 16) making a total of 56 sites in all.

### YIELD MEASUREMENT OF RICE DEMONSTRATION PLOTS

For the 2012 harvest in October/November because of time constraints it is proposed to only measure the yield accurately on 20% of the plots (five per site). A 5m by 5m subplot will be randomly located with each of the sites for which a yields measurement is to take place. (They should also be randomly located). The 25m<sup>2</sup> subplot can marked out using a cord with knots at 5m to make a square and the rice harvested from with the sub-plot. Alternatively a triangular shaped sub-plot can be used. After harvest the rice is to be threshed and dried to around 14% moisture before being weighed. At a yield of 1,000kg per ha, the amount of un-husked rice from a 25m<sup>2</sup> sub-plot will be 2.5kg. It is proposed that the agricultural extension officers should be

responsible for the yields measurement from the demonstration plots with the County M&E officer providing support and consolidating the data.

**CROP MONITORING OF RICE PRODUCTION IN PRIMARY COUNTIES**

Monitoring of rice production and yields from the greater population of rice producers within the program primary counties should be done with a random sample of producers representative of the population. Overall the BLS indicated that 77% of the surveyed households cultivated rice with a range from 87% of households in Lofa to 52% in Grand Bassa. Applying the average family size indicated by the BLS to the 2008 census statistics indicates a total of 177,000 agricultural households in the four primary counties, of which, if 77% on average cultivate rice, indicates there are a total of 136,314 rice producing households. The details and distribution by county is shown in the table below.

**Table 9: Estimated Number of Households Growing Rice in the Primary Counties**

Population (2007 census)	Ave no. persons per HH	Total no. of HHs	Percent HHs with rice	Estimated no. HHs growing rice
Bassa	7.1	31,188	52%	16,218
Bong	6.8	45,564	75%	34,173
Loffa	5.7	42,270	87%	36,775
Nimba	7.2	59,944	84%	50,353
<b>Total</b>	<b>6.8</b>	<b>177,031</b>	<b>77%</b>	<b>136,314</b>

**SAMPLE SIZE**

The sample size calculator provided in the website [www.research-advisors.com/SamplaSize.htm](http://www.research-advisors.com/SamplaSize.htm) provides a table to indicate the optimal sample size for a given population size, a specific margin of error, and a desired confidence level. (Shown in appendix I) The table indicates that for a population of between 100,000 to 250,000 a sample of 383 is sufficient to provide a confidence level of 95% with a 5% margin of error, the level of accuracy that is considered adequate for most surveys.

A sample of 383 households is 0.28% of the population of rice-growing households. If it is accepted that a sample of 385 households is sufficient, then proportionally it could be distributed as 50 households each in Grand Bassa, 100 each in Bong and Lofa and 140 in Nimba.

More households cultivate upland rice than lowland rice. The BLS indicated that 21% of the plots that households have are swamp (lowland) with the majority upland. For those plots that the BSL recorded the actual area, overall 18% of all the land under the control of the households is swamp land, but with a considerable variation between the four counties ranging from 34% in Grand Bassa to 9% in Nimba. Further stratification of rice land may be required to ensure a representative sample of lowland rice fields are surveyed.

**Table 10: Percentage of Swamp Land in the Four Counties**

County	Swamp	Upland	Total	% Swamp	% Upland
Bassa	277.2	528.1	805.3	34%	66%
Bong	565.3	1571	2,136.5	26%	73%

Lofa	106.7	719.25	826.0	13%	86%
Nimba	283.5	2,746.4	3,029.9	9%	91%
<b>Total</b>	<b>1,232.7</b>	<b>5,564.7</b>	<b>6,808.5</b>	<b>18%</b>	<b>82%</b>

The random of rice producers should be distributed through all districts in the county, proportional to the population in each district to ensure that the sample is representative of all rice producers.

**Yield crop-cutting for upland rice.** In the 1970s a team from FAO conducted an upland rice yield survey in Lofa county. The method used was that in the selected upland rice plot three triangles were set out at random in the middle part of the field, indicated by sticks connected by ropes, each measuring 100 sq feet or 11.2 sq meter. Care was taken to avoid selecting sample plots near the edge of the field or near remaining trees or tree stumps. The rice within the subplots was harvested, threshed and sun-dried and the yield measured as unhusked rice. In this case the rice was purchased from the farmer and taken back to the team’s base to be dried and weighed.

Most upland rice fields are intercropped with vegetables and other crops. In selecting the sample triangles, care was taken that no banana or cassava plants were included. The sample triangles therefore, only included areas with pure stands of rice plants. If possible the sticks and ropes needed to mark the three sample plots were placed in the field one day before the farmer intended to start harvesting his rice plot.

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or unhusked rice from the sub-plot will need to be purchased from the farmer and taken back to the survey team’s base to be dried and measured. The weight of the wet rice should also be weighted immediately after it has been threshed so that the weight of the wet rice can be compared to the weight of the dry sample (which will have a moisture content of around 14%). This will enable a conversion factor to be developed to convert a wet rice yield to dry rice yield; useful when it is not practical to dry the production from the yield sub-plot.

**Labor inputs.** The labor involved in crop production including all operations associated with growing the crop including the initial land clearing, land cultivation, planting, weeding etc. can be recorded on a monitoring form. Labor inputs should be recorded as the number of days for each activity, either family labor, at no monetary cost, or hired. Where labor is provided through some form of communal work-share arrangement involving payment in-kind as food, then a monetary value needs to be attributed to this to reflect the actual cost to rice production. The

proportion of the work for each activity that is done by men or women should also be noted, as a percentage.

**Expenditure.** Actual production expenditure should be recorded, although for traditional rice production many households do not incur any expenditure in dollars because labor is provided by the family or through a group communal arrangement. In that case any expenditure is limited to hired labor, and the purchase of tools and bags.

**Consumption and sale.** The percentage of the farmer’s rice production that is consumed by the household and the percentage that is sold, or bartered for other products, is also to be recorded on the form.

**RICE PRODUCTION MONITORING FORM**

A template form to use for recording all the key information relating to rice production for each sampled farmer’s field(s) is shown below in Table 3.

**Table 11: Rice Production Monitoring Form**

**FED RICE PRODUCTION MONITORING FORM**

FED Indicator 1A

Name of Respondent/Farmer: \_\_\_\_\_ FED ID # \_\_\_\_\_

Gender: Female  Male

Address: County: \_\_\_\_\_ District: \_\_\_\_\_ Town/village: \_\_\_\_\_

Type of Household:  Female-only headed household  Male-only headed household  Joint Male and Female

Key contact information - phone numbers(s): \_\_\_\_\_

GPS Reading at Location- UTM 29 N \_\_\_\_\_ m E \_\_\_\_\_ m N Date: \_\_\_\_/\_\_\_\_/\_\_\_\_  
 UTM 29 N/P \_\_\_\_\_ UTM \_\_\_\_\_ (alternative format)

**Rice Field Characteristics** Lowland  Upland

**1. Area cultivated** Field area \_\_\_\_\_ hectares  
 Field measured by \_\_\_\_\_ date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 Field shape: Square  Rectangular  Irregular

**2. Yield of Rice** Sub-plot area \_\_\_\_\_ square meters Production \_\_\_\_\_ WET kg (paddy rice)  
 \_\_\_\_\_ DRY kg (paddy rice)  
 Sub-plot yield measured by: \_\_\_\_\_ date \_\_\_\_/\_\_\_\_/\_\_\_\_  
 Equivalent yield per ha \_\_\_\_\_ kg/ha (of DRY un-husked rice)

**Rice Production Activities and Costs**

Labor Inputs and Cost	No. persons A.	No. days B	Total days AxB	Percent male/ female	Family labor no. days	Hired labor no. days	Cost LD
Land clearing							
Land preparation & bunds							
Seed nursery							
Seeding/ transplanting							
Weeding							
Fertilizer application							
Pesticide application							
Irrigation							
Harvesting							
Drying							
Threshing							
Transport							
Storage							
Other							
<b>Total labor inputs</b>							

**Expenditure on rice production** I had actual LD expenditure on my rice production Yes  No

Cost LD Comments (note if any inputs were provided free)

Seeds		
Hired labor	land preparation	_____
	transplanting	_____
	weeding	_____
	harvesting	_____
Fertilizer		_____
Pesticides		_____
Tools (hoes etc.)		_____
Bags etc.		_____
Other		_____
<b>Total expenditure</b>		_____

**MARKETING**

Percent of crop consumed by the Farmers Household	<input type="text"/>	<b>Average price</b>	
Percent of crop Sold or Bartered	<input type="text"/>		
	LD per unit	LD _____	Unit _____ kg

Monitoring form completed by (print and sign name) \_\_\_\_\_ Date \_\_\_\_\_

Verified by M&E Team (print and sign name) \_\_\_\_\_ Date \_\_\_\_\_

## 2012 FED M&E RICE SURVEY RESULTS

In Year 1, FED focused its rice value chain development efforts on the rehabilitation of previously developed lowland rice sites and on improving cultural practices at both the lowland sites and a smaller number of upland sites. In all, 23 lowland sites were at least partially rehabilitated and improved cultural practices introduced to these lowland sites plus 4 upland sites. These lowland activities demonstrated improved cultural practices (seed, line planting, and fertilizer) to an estimated 18.6 hectares and 675 participating farmers.

During the 2012 rainy season in October/November 2013 a local company was hired to provide a supervisor, 4 lead enumerators (1 per county) and 12 enumerators. The field team of surveyors was trained to make a quick estimate of rice yields. CRDI was formed following the April 2012 FED baseline survey by the Cuttingham University graduates who had been hired for the baseline survey. The rice survey was seen as part of the capacity building of that young organization.

The number of surveys completed totaled 391 farmers, including 354 upland farmers and 37 lowland farmers. Of the upland farmers, there were 6 that received FED support. Of the 37 lowland farmers surveyed, there were 13 that received FED support and 24 that did not. The 24 non-FED participant lowland farmers were surveyed on their household plots. Of the total of 27 demonstration plots, (23 lowland, 4 upland) fourteen (14) FED supported groups were not surveyed as the plots were not yet ready for harvest during the survey period. No individuals who participated in the FED demonstrations were surveyed on their own household plots. These individuals will be surveyed in a sample to include the baseline surveys for the newly selected Year 2 sites.

### YIELD ANALYSIS

Based on the survey samples from FED lowland demonstration plots, the average sampled yield for the FED supported groups was 2.6 mt/ha. Additional harvest yields were also obtained from the groups that kept records of the total harvest from the entire demonstration plots. These figures included the yields from the entire plot, including the poorer performing and the better yielding portions. The average yield from these entire field samples was 1.07 mt/ha. This suggests that the sampling was biased towards the better areas of the field.

For an estimate of average yield for comparison purposes in the next season, these two yield measurements have been averaged to serve as representative of the FED lowland demonstration plots. This average yield from the demonstration plots of 1.94 mt/ha for the first year of FED will be used to compare progress in the next growing season.

A sample of yield comparisons is provided in the table below. These show yields for non-FED assisted lowland farms, a combination of FED and non-FED assisted sites and the FED assisted sites. Upland yields for non-FED assisted plots were measured and the average yield was 2.19 mt/ha. All yields were calculated after disposing of the yield results that exceed 3.1 mt/ha.

Number of Samples	Field Type	FED or non-FED Assistance	Average Yield
10	Lowland	Non-FED Assisted	2.2 mt/ha

14	Lowland	Combined FED and non-FED Assisted	2.3 mt/ha
5	Lowland	FED Assisted	2.6 mt/ha
211	Upland	Non-FED Assisted	2.19 mt/ha

## **COST OF INPUTS**

There were questions in the rice survey about the cost of inputs farmers incurred on their own land. Information on these costs indicates a wide range of input use and costs. The inputs considered in the survey included Land Preparation, Transplanting, Weeding, Harvesting, Fertilizer, Tools, Bags, Transport to market, and other.

Across all farms that reported some costs (FED demonstration farms were not included), the average estimated input costs per farm was US\$362.63 (LD 25,374.05). When broken down by land type, the average estimated cost for upland farms was \$381.43 (LD 26,699.82) per farm. When considering just lowland farms with no FED support, the cost of inputs averages US\$287.15 (LD 20,100.53). Since no records were kept by the farmers interviewed, these estimates are suspect, but provide a starting point for examining inputs during the next growing season. There was a wide range in costs per input, which goes from 0 to LD 320,000 (the high end being for weeding and transplanting on upland farms). Caution needs to be exercised as there are uncertainties as to how the questions were posed, where the farmers were getting the response numbers, and whether there were some misunderstandings as to just what the questions were asking them to estimate.

## **RICE SALES**

The percentage of rice sales as reported by the farmers surveyed varied widely. The demonstration groups reported selling a much larger percentage of the harvest than non-demonstration individuals. An unknown percentage of the harvest from the demonstration plots was returned to FED, another percent was given back to members for planting next year, and a larger portion was under discussion as to how the group would allocate the rice or the funds from the sale in local markets. These discussions are probably still on-going in some villages. In fact, a few villages only completed their harvest in January and early February.

For the non-FED lowland farmers, the average percent of their harvest sold was about 13.4 percent, i.e. 86.6% was still left on farm at the time. For upland non-FED farmers, the average percent sold into local markets was 15.95 percent (84.05% still on the farm). Most of these sales of rice were to members of the village and nearby weekly markets.

## ANNEX IV. LIST OF CONTACTS

Organization	Primary contacts	e-mail	phone	Meeting date
Ministry of Commerce and Industry	Steve Flahn Paye, Director of Price Analysis and Markets		0886515392	3/4/2013
	Stephen Zaizay, Senior Price Analyst		0886835756	3/4/2013
	John Spray, Economist	John/spray.moci@gmail.com	0888062117	4/4/2013
Ministry of Agriculture	Moses Zinnah, Deputy Minister	Mmzinnah57@yahoo.com	0886420955	2/4/2013
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	Edward Barloh, WAAPP M&E Officer	azariah_eduardo@yahoo.com	0886524003	5/4/2013
	Aaron Marshall, Rice Coordinator of AIDP Project	agarway@yahoo.com		Email correspondence 5/4/2013
Liberian Institute of Statistics and Geo-Spatial	Peter Kun, Agricultural Statistics Officer	<a href="mailto:Peterkun06@yahoo.com">Peterkun06@yahoo.com</a>	0880658385	10/.4/2013

Services (LISGIS)	Mariah Quaye, Price Statistics Officer	Mrhluv26@yahoo.com		10/4/2013
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	Surendra Bhatta, Senior Agriculture/Agribusiness Advisor	Sbhatta@uasaid.gov		3/4/2013, 16/4/2013
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	John Ellis, Economist			3/4/2013
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Bong Mines Farmer Association	Farmers			5/4/2013
Rice merchants				5/4/2013
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Food and Enterprise Development/USAID	Jonathan Greenham, Chief of Party	Jonathan_Greenham@dai.com	0880350500	1-16/4/2013
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