FOOD AND ENTERPRISE DEVELOPMENT (FED) PROGRAM FOR LIBERIA

POLICY SEQUENCING ASSESSMENT FOR LIBERIA'S RICE VALUE CHAIN

OCTOBER 2015

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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

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. USAID FED is focused on four priority counties (Grand Bassa, Bong, Nimba and Lofa) and two secondary counties, (Magribi and Montserrado). USAID 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 USAID 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.

As part of Component 2 FED is working to support key institutions of the Government of Liberia (GoL) to develop the technical capacity in order to identify, formulate, and implement policies and practices that facilitate the growth of the private sector's role in enhancing food crop agriculture. In this regard FED recognizes that to be effective in developing policies that support the growth of domestic agribusiness, the GoL need access to evidenced based advice as part of their policy formation process. USAID FED has been instrumental in previously supporting both the MoA and MoCI gain access to such advice, especially in the rice value-chain, and USIAD FED now intends to continue to support the MoCI as they seek to redefine the GoL's current Rice Importation Policy.

The MoCI was tasked in 2015 to set up a Technical Group to provide recommendations to inform and to prepare a daft for a new Rice Policy and Strategy for Liberia, which addresses the current constraints to domestic production and will support a significant growth in the sector over the next 10 years. It is intended that in addition to taking on the concerns of stakeholders, this policy document should also provide accurate research based analysis of the sector currently, evaluate the successes / failures of previous reforms and provide an outline of what the sector can look like with new policies.

The objective of this report is to provide an analysis that:

- Provides information on recent global trends in rice production and trade, and analysis of potential impact to Liberia in the next two to ten years.
- Provides updated analyses and 10-year forecast on rice consumption, importation and production in Liberia assuming business as usual vs. with scaling up of FED experience.
- Provides a comparative analysis of rice policy incentives in ECOWAS countries and their impact on rice production, self-sufficiency rating and GDP.
- Provides a review and feedback on the draft of the Proposed Rice Policy and Strategy for Liberia document.

- Provides ad hoc expert advice and inputs to the final draft of the Rice Policy slated to be submitted to the President in October 2015
- Provides recommendations to USAID, the GoL, other donors, private sector partners and other stakeholders on the next steps after FED to ensure gains achieved under the FED project are optimized towards continuing growth of the rice sub-sector.

The analysis identifies current initiatives and policies, evaluates their impact on the rice value chain, and suggests new and proposed sequencing of policies and future activities that will help to achieve the FED strategy and the GoL Proposed Rice Policy and Strategy.

The rice sector in Liberia is the most important staple food component of the food and agricultural economy. In 2009 rice contributed 43% of the total daily calories consumed by the Liberian population[1]. FAO estimates that in 2012, rice generated a value of $77.9 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 1 shows the production data for both paddy rice and fresh cassava in Liberia for the 2012 crop year and a comparison with other recent years[2]. Domestic demand relative to domestic production has resulted in a significant deficit which has been met increasingly by imported rice (Figure 3)[3].

Figure 1: Production value and quantity of commodities in Liberia, 2012
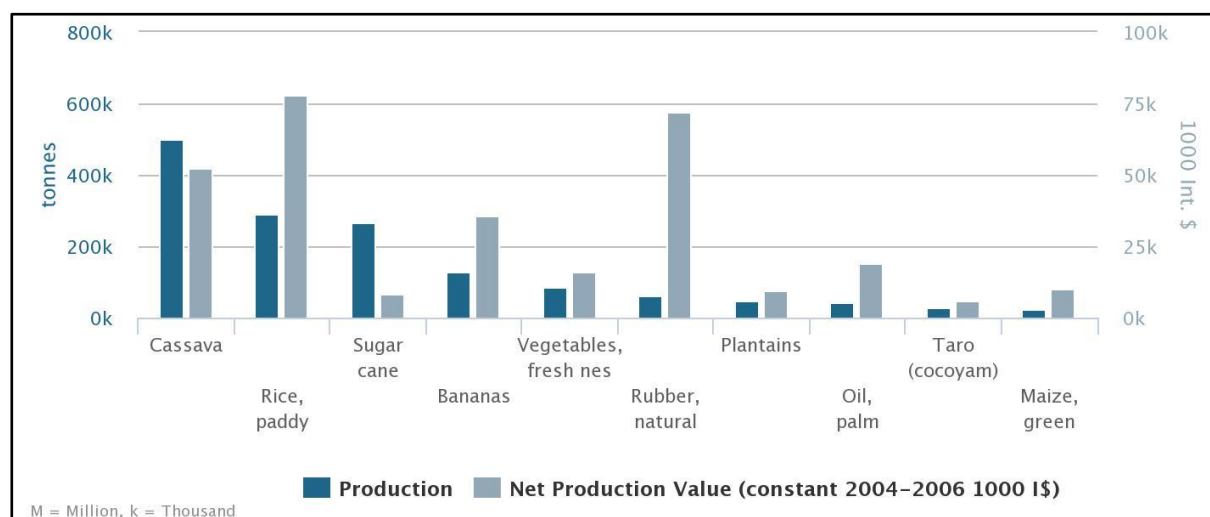
Source: UN/FAO FAOSTAT. February, 2014. At: http://faostat.fao.org/site/339/default.aspx

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[1] Food and Agriculture Organization, United Nations. FAOSTAT. Food Balance Sheet.
[2] Ministry of Agriculture. *2012 Agricultural Statistics Yearbook* (forthcoming).
[3] United States Department of Agriculture. *Production, Supply and Distribution Online*.

Table 1. Rice and Cassava Production, Area Harvested and Yield, 2008-2012

Description	Unit	Year					Percent Change	
		2012	2011	2010	2009	2008	Average (010-011)	Average (09-08)
PRODUCTION								
Paddy Rice	MT	297,190	290,650	296,090	293,000	279,000	1.3	3.9
Fresh Cassava	MT	485,190	489,270	493,000	495,300	496,290	-1.2	-2.1
Total	**MT**	**782,380**	**779,920**	**789,090**	**788,300**	**775,290**	**-0.3**	**0.1**
AREA HARVESTED								
Rice	HA.	246,380	238,780	251,230	247,580	222,760	0.6	4.8
Cassava	HA,	61,050	61,040	61,470	63,210	57,360	-0.3	1.3
Total	**HA.**	**307,430**	**299,820**	**312,700**	**310,790**	**280,120**	**0.4**	**4.1**
YIELDS PER HA,								
Rice	KG	1,206	1,217	1,179	1,183	1,253	0.7	-1.0
Cassava	KG	7,947	8,016	8,020	7,835	8,652	-0.9	-3.6
FARMS								
Rice	NUM	**241,750**	242,800	241,310	245,840	231,650	-0.1	1.3
Cassava	NUM	**120,710**	122,520	119,370	120,560	117,730	-0.2	1.3
Total		**362,460**	**365,320**	**360,680**	**366,400**	**349,380**	**-0.1**	**1.3**

Source: 2012 Liberia Agricultural Statistics Yearbook (draft).

Figure 2: Rice (paddy) yields per hectare for selected West African countries and the World (MT/ha), 2000-2013
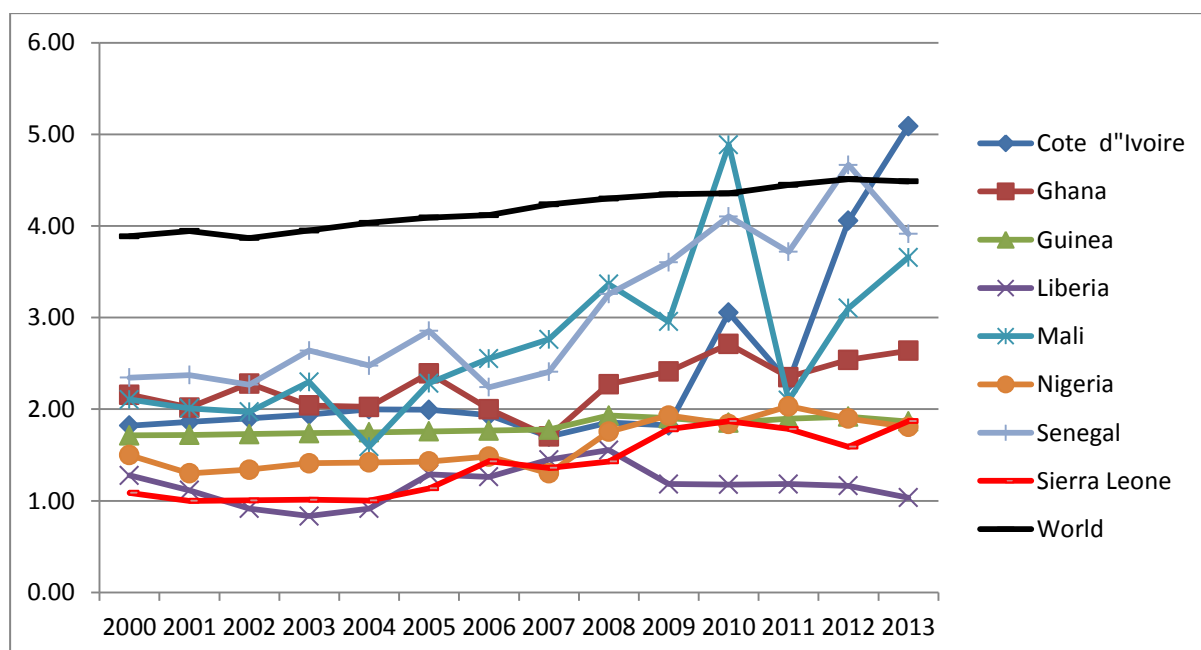
Source: UN/FAO FAOSTAT.

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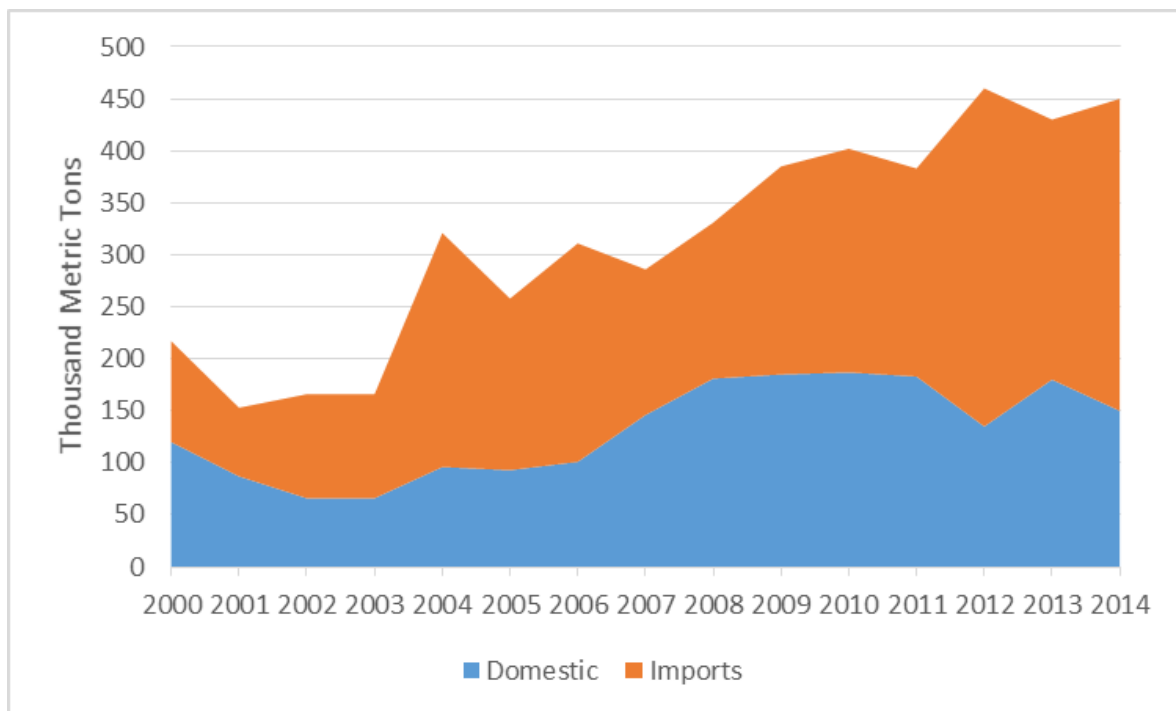
Source: USDA, PSD Online.

Facing low productivity, high post-harvest losses[4], and a severely underdeveloped value chain, the Feed the Future Liberia strategy[5] has 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 this policy sequencing assessment is based on discussions with farmers, merchants, FED staff, USAID/Liberia staff, officials of the Ministry of Agriculture, Ministry of Commerce and Industry, Ministry of Finance, Liberia Institute of Statistics and Geospatial Information Services, and FAO/World Food Program. Existing data, reports, policies, programs and strategies were sourced, reviewed and referenced. The Arkansas Global Rice Model (AGRM) provides a framework to understand the competitive environment from rice imports to which the domestic rice market in Liberia is confronted. This model is also used

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[4] IRIN (Integrated Regional Information Networks of the UN Office for the Coordination of Humanitarian Affairs) report in 2010 the post-harvest losses for rice were as high as 36% in 2007 and 28% in 2008. http://www.irinnews.org/report/87730/liberia-reclaiming-rice-from-rats-and-rot. See also *Post Harvest Crop Assessment-Liberia, Rice and Cassava, Final Report.* ITTAS Consultancy LTD. August 2008. At: http://www.moa.gov.lr/doc/CFSNS.doc
[5] U.S. Government. (2011) Liberia FY 2011-2015 Multi-Year Strategy. USAID. feedthefuture.gov

to simulate the effects of production lifting and trade policy sequencing in order to provide recommendations. Finally, this analysis is guided by the Gap and Policy Analysis that was provided by Wailes in 2012, 2013 and 2014.

GLOBAL CONTEXT OF LIBERIA'S RICE ECONOMY

OVERVIEW

Given the high level of dependency of Liberia on rice imports, it is useful to understand the current and projected global rice economy. As experienced in 2008 and again in 2014 during the Ebola crisis, Liberia is vulnerable and constrained by its access to a volatile global rice market. The current global market is being driven by two events. The first is that Thailand has ended its Paddy Pledging Program (PPP). This domestic price support program provided a price floor to Thai rice farmers above competitor (India and Vietnam) prices and resulted in very large rice stock accumulation in Thailand as their exports in 2011 and 2012 were not competitive. With the termination of the PPP, Thailand re-entered the global rice export market with large surpluses. A second event is that China has become a significant rice importer as it no longer strongly defends a self-sufficiency policy towards rice. Over the past two years, China has accounted for up to 10 percent of world rice imports. Without the return of Thailand to the export market and the emergence of Cambodia and Myanmar as increasingly important rice exporting countries, China's rice demand would have otherwise resulted in higher world prices.

With steady export supply from India, Pakistan, Vietnam and the United States, and growth in exports from Thailand, Cambodia and Myanmar, international rice prices for long grain white rice has been pressured downward below $400 per metric ton and this price pressure is projected to continue in the near term.[6]

Over the next 10 years, growth in import demand particularly in West Africa, the Middle East and South East Asia (Philippines and Indonesia) are expected to challenge export supplies and drive global rice prices higher to $500 per metric ton.

International rice prices are highly volatile due to a number of reasons. Rice has an inelastic supply and demand with respect to prices 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 8% of rice production is traded as opposed to 10% for coarse grains and 16% 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. With Thailand

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[6] Wailes, Eric and Eddie C Chavez. 2015. *International Rice Baseline Briefing Book, 2014-2024.*
http://www.uark.edu/ua/ricersch/pdfs/World_Rice_Outlook_International_Baseline_Projections_2014-2024.pdf

releasing of its huge stocks from older crops to the open international market at a loss, combined with plentiful supplies in the other major exporters, the global rice market is expected to face an abundant supply of rice over the intermediate term—with a consequent dampening effect on international rice prices. While this situation is beneficial for food-deficit rice-importing countries in the developing world, it creates increased pressure for productivity growth in countries such as Liberia, seeking to become less dependent on imports.

Based on projections of the Arkansas Global Rice Model (AGRM)[7] the average reference international long grain rice price is projected to increase steadily from $386 per metric ton (mt) in 2015 to $538 in 2025 (Figure 4). However in real terms (2000 USD) the price is expected to remain relatively flat at or near $400 per metric ton (Wailes and Chavez, 2015). As discussed above, international rice prices are uncertain and volatile, therefore our projections suggest an 80% confidence interval within which long-grain prices are likely to be as low as $340/mt to as high as $575/mt over the next 10 years (Figure 5).

Figure 4: World reference rice prices, 2002-2023 (Arkansas Global Rice Model Projections)
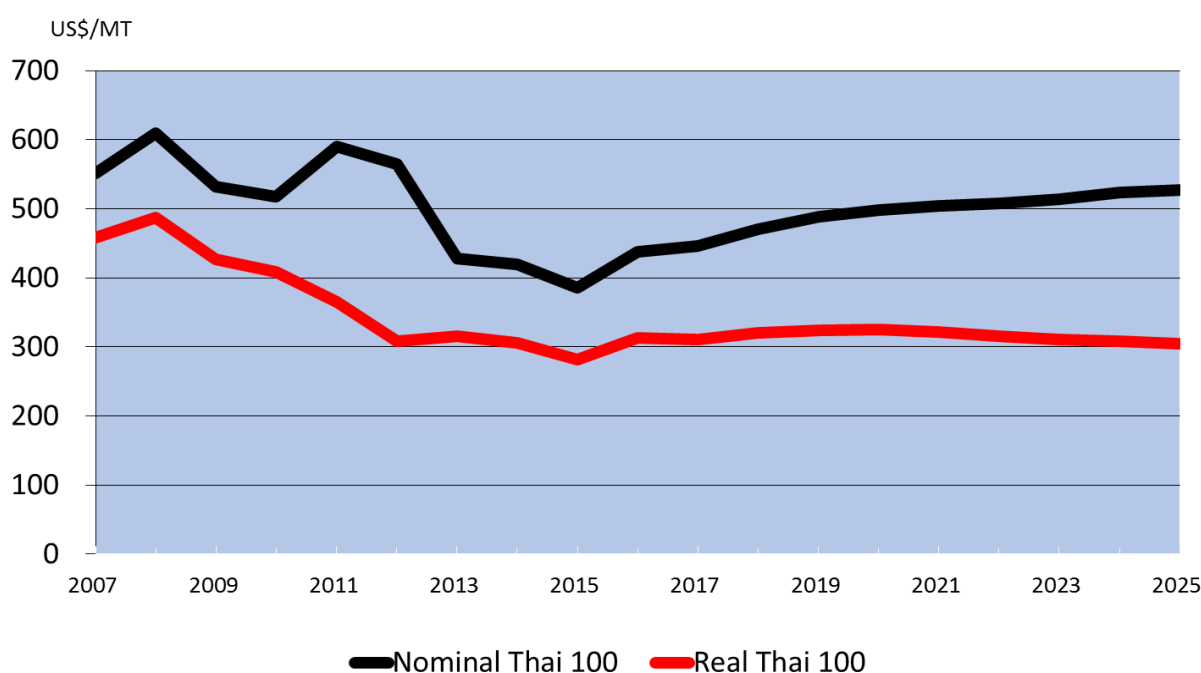
Source: Wailes and Chavez, August 2015.

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[7] For a brief description of the Arkansas Global Rice Model refer to Annex II.

Figure 5: Stochastic Projection of International Reference Price for Long-grain white rice
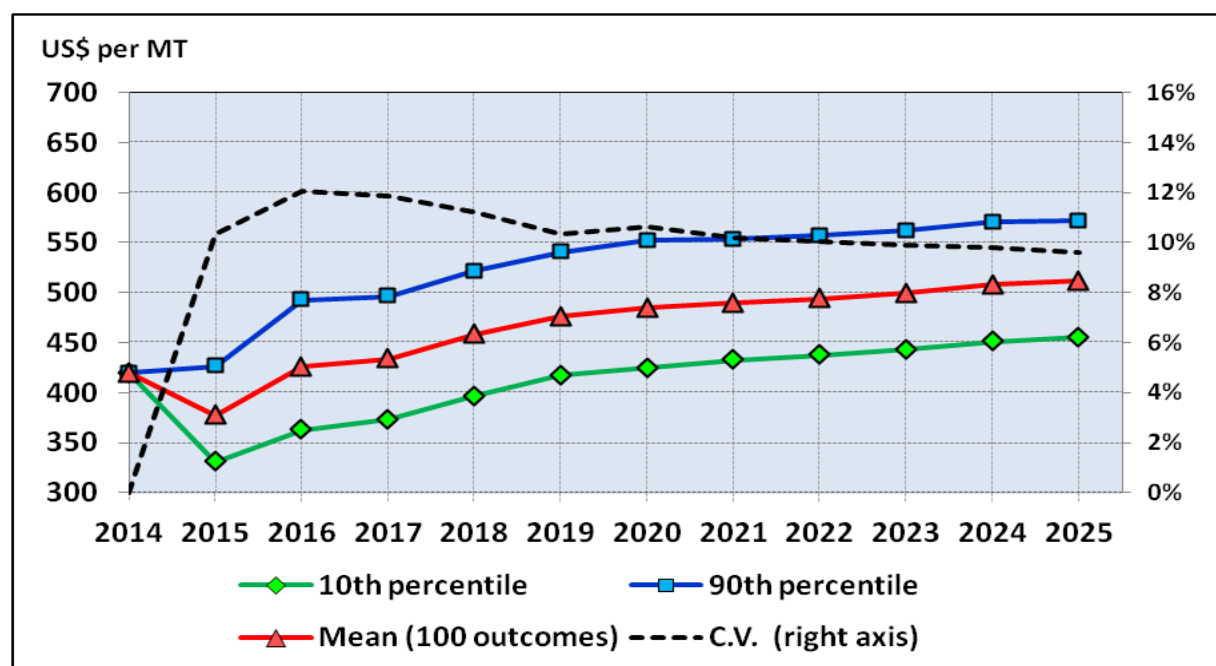
Source: Wailes and Chavez, August 2015.

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).

Over the baseline period (2015-2025), world rice output grows at 1.0% per year, with 0.8% coming from yield improvement and 0.2% from slight growth in area harvested. Driven solely by population growth, total global rice consumption gains 1.0% annually—as average world per capita rice use declines slightly.

Total trade is projected to increase from 39 million metric tons (mmt) in 2012 to 46.7 mmt by 2025. Net trade continues to grow at 1.6% per year, increasing from 42 mmt in 2015 to 48 mmt in 2025. Country and regional net trade projections are reported in Table 3. Thailand, India, Vietnam, Pakistan and the United States are expected to as remain major rice exporters. The greatest uncertainty with regard to exports is India, a country that historically has exported erratically, based on the surplus or deficit rice production resulting from it monsoon climate. Cambodia and Myanmar are projected to become major rice exporters, accounting for 38% of the growth in global rice exports over the next decade, as both countries develop their competitive advantage in rice production. ECOWAS member nations are projected to contribute nearly one-half of the growth in world rice net trade, increasing from 8.1 mmt in 2015 to 11 mmt in 2025.

Table 4 presents projected average milled yields per hectare for all modeled and aggregate regions. The projected yields reflect a large variation in productivity and improvement by 2025. Average world yields in 2015 of 2.97 t/ha improve to 3.26 by 2025. Liberia has one of the lowest milled yields and in the baseline is projected to improve from the 2015 level of 0.65 t/ha to 0.95 by 2025.

Total world consumption of rice is projected to increase from 484 MMT in 2015 to 525 MMT by 2025. None of this growth is achieved at the global level by increases in per capita consumption. Table 5 shows that world per capita production begins to decline from a level of 66.6 kg in 2017 to 64.6 kg by 2025. Many Asian nations are projected with declining per capita consumption but most African and particularly West African nations show rising per capita rice consumption to 2025.

Table 2. World Rice Supply and Utilization Estimates, 2014-2025

Variable	Unit / Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Area Harvested	(1000 ha)	160,161	160,998	161,039	161,159	161,102	161,203	161,433	161,352	161,463	161,598	161,545	161,463
Yield	(mt/ha)	2.97	2.97	3.01	3.04	3.07	3.10	3.13	3.16	3.19	3.22	3.24	3.26
Production	(1000 mt)	476,233	478,823	485,163	490,334	494,364	499,911	505,676	509,964	515,541	520,304	523,615	526,844
Per Capita Use	(kg)	66.3	66.2	65.8	65.6	65.4	65.1	65.0	64.8	64.7	64.7	64.7	64.6
Total Consumption	(1000 mt)	483,177	487,603	490,353	494,193	497,870	500,563	504,634	507,883	511,886	516,748	520,912	524,926
Exports	(1000 mt)	42,354	42,033	41,589	41,973	42,598	43,209	43,737	44,452	45,274	46,053	47,121	47,879
Imports	(1000 mt)	41,933	42,033	41,589	41,973	42,598	43,209	43,737	44,452	45,274	46,053	47,121	47,879
Ending Stocks	(1000 mt)	100,028	91,207	86,000	82,136	78,648	78,039	79,133	81,284	85,030	88,675	91,483	93,517

Source: Wailes and Chavez, August, 2015

Table 3. World Rice Net Trade by Country and Prices, 2014 to 2025

Table 3. World Rice Net Trade by Country and Prices												
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Net Exporters	(Thousand Metric Tons)											
Argentina	445	429	483	525	559	580	600	617	628	640	656	668
Australia	250	141	158	171	197	224	237	256	278	282	298	312
Cambodia	1,100	1,006	1,178	1,391	1,611	1,826	2,032	2,220	2,384	2,518	2,604	2,757
Lao PDR	-25	-8	0	5	26	50	73	104	152	183	223	237
Egypt	225	429	487	514	543	561	575	586	592	595	592	580
India	10,600	8,401	7,972	7,853	7,838	7,895	7,879	7,754	7,482	7,417	7,529	7,546
Myanmar (Burma)	2,000	2,231	2,114	2,073	2,109	2,246	2,299	2,424	2,543	2,716	2,848	2,956
Pakistan	3,970	4,014	3,946	4,067	4,174	4,165	4,149	4,171	4,171	4,164	4,142	4,076
Thailand	8,700	9,788	9,709	9,592	9,549	9,478	9,575	9,823	10,387	10,786	11,367	11,733
United States	2,436	2,597	2,635	2,721	2,773	2,815	2,830	2,836	2,874	2,894	2,913	2,938
Uruguay	950	947	972	1,015	1,052	1,090	1,132	1,164	1,190	1,211	1,218	1,224
Vietnam	6,300	6,559	6,372	6,377	6,502	6,605	6,652	6,787	6,888	6,920	6,993	7,076
Brazil	500	112	316	432	495	672	796	854	924	953	982	997
Paraguay	418	490	536	554	548	561	570	566	565	566	563	568
Total Net Exports	37,869	37,134	36,881	37,290	37,975	38,769	39,400	40,161	41,058	41,845	42,927	43,668
Net Importers	(Thousand Metric Tons)											
Bangladesh	1,165	856	609	626	803	918	947	843	877	913	978	904
People's Republic of China	4,000	4,267	3,569	3,435	3,417	3,399	3,380	3,358	3,325	3,294	3,276	3,264
Brunei Darussalam	40	39	41	43	45	46	47	48	49	50	51	52
Cameroon	525	532	593	651	688	738	768	787	813	834	859	891
Canada	350	363	376	394	408	415	422	431	439	447	454	462
China - Hong Kong	380	420	422	428	427	427	428	429	431	432	432	433
Colombia	350	343	342	355	365	364	372	381	388	393	396	405
Cote d'Ivoire	1,020	964	913	923	969	1,005	1,029	1,051	1,064	1,086	1,134	1,148
European Union-28	1,350	1,238	1,243	1,248	1,254	1,260	1,270	1,285	1,311	1,333	1,336	1,353
Ghana	650	655	664	698	728	750	789	819	844	881	917	949
Guinea	250	298	318	342	343	346	341	330	318	306	299	304
Indonesia	1,250	1,147	1,677	1,374	1,443	1,326	1,147	1,139	1,074	1,144	1,102	1,087
Iran	1,500	1,604	1,719	1,803	1,873	1,917	1,956	1,976	2,004	2,053	2,099	2,126
Iraq	1,250	1,391	1,479	1,539	1,582	1,629	1,686	1,747	1,802	1,856	1,912	1,973
Japan	625	607	607	607	607	607	607	607	607	607	607	607
Kenya	420	421	435	454	469	496	527	559	565	589	619	661
Liberia	300	298	298	294	295	301	310	325	340	354	364	382
Malaysia	950	1,003	1,072	1,079	1,103	1,089	1,090	1,089	1,094	1,113	1,135	1,150
Mali	200	139	136	116	102	92	97	89	67	72	53	77
Mexico	697	784	769	782	790	813	829	845	856	859	884	896
Mozambique	480	498	506	521	548	577	618	652	683	719	755	799
Nigeria	4,000	3,048	3,109	3,143	3,115	3,239	3,395	3,581	3,773	3,946	4,181	4,270
Philippines	1,700	1,293	1,185	1,393	1,422	1,495	1,511	1,481	1,515	1,560	1,627	1,696
Saudi Arabia	1,460	1,549	1,498	1,549	1,580	1,610	1,640	1,670	1,698	1,725	1,751	1,776
Senegal	1,090	1,091	1,094	1,125	1,145	1,172	1,187	1,209	1,241	1,275	1,304	1,339
Sierra Leone	220	217	173	163	154	161	167	179	163	168	173	187
Singapore	300	305	312	317	319	320	323	325	327	328	329	330
South Africa	870	1,046	1,070	1,068	1,069	1,067	1,070	1,082	1,098	1,104	1,111	1,137
South Korea	468	409	409	409	409	409	409	409	409	409	409	409
Taiwan	106	107	107	107	107	107	107	107	107	107	107	107
Tanzania	70	190	172	167	152	146	152	151	154	165	186	221
Turkey	290	323	287	275	278	287	289	292	313	326	320	324
Other Africa	2,525	2,833	2,814	2,828	2,845	2,911	2,965	3,018	3,092	3,053	3,183	3,213
Other Americas	511	523	483	481	496	492	495	530	561	565	585	593
Other Asia	3,351	3,445	3,391	3,396	3,383	3,556	3,666	3,907	4,153	4,164	4,287	4,340
Other Europe	120	145	138	139	139	140	142	145	147	149	151	154
Other Oceania	45	60	75	90	105	120	133	145	155	164	172	178
Ecowas 7	1,400	1,410	1,521	1,635	1,709	1,776	1,858	1,951	2,050	2,151	2,254	2,336
Cuba	450	493	454	458	458	440	447	443	437	438	440	446
Costa Rica	100	108	116	125	123	125	130	133	137	141	143	147
Dominican Republic	15	14	20	10	9	4	3	0	-1	-2	-3	-3
Guatemala	70	75	75	78	81	84	87	90	93	97	100	103
Honduras	110	115	106	105	104	103	103	103	104	105	106	107
Nicaragua	65	66	69	69	68	67	67	68	69	71	72	73
Panama	80	79	81	81	79	78	79	78	78	76	75	74
Chile	145	142	145	148	149	153	156	158	161	164	168	171
Peru	135	149	172	214	239	235	210	185	164	149	139	131
Residual	421	30	17	5	-19	-42	-53	-70	-91	-90	-104	-116
Total Net Imports	37,869	37,134	36,881	37,290	37,975	38,769	39,400	40,161	41,058	41,845	42,927	43,668
Prices	(U.S. Dollars per Metric Ton)											
Thai 100%B World Reference	420	386	438	446	470	488	498	504	508	514	523	527
U.S. FOB Gulf Ports	518	501	511	513	529	540	541	541	537	536	537	533
U.S. No. 2 Medium FOB CA	877	855	842	840	837	839	838	840	842	825	835	834
Source: Arkansas Global Rice Model, August, 2015.												

Source: Arkansas Global Rice Model, August, 2015.

Table 4. Projected Rice Milled Yields per Hectare for the World and Selected Countries

Table 4. Projected Rice Milled Yields Per Hectare for the World and Selected Countries

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	(Metric Tons per Hectare)											
Argentina	4.39	4.34	4.34	4.41	4.47	4.53	4.59	4.65	4.69	4.73	4.80	4.87
Australia	7.34	7.04	7.07	7.14	7.23	7.31	7.40	7.49	7.59	7.68	7.78	7.87
Bangladesh	2.92	2.92	2.97	3.03	3.07	3.11	3.15	3.20	3.24	3.28	3.32	3.36
Brazil	3.65	3.48	3.51	3.53	3.57	3.64	3.68	3.72	3.76	3.80	3.83	3.88
Brunei Darussalam	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Cambodia	1.55	1.60	1.65	1.73	1.79	1.84	1.89	1.95	2.00	2.05	2.08	2.13
Cameroon	0.91	0.92	0.97	1.02	1.04	1.06	1.08	1.10	1.12	1.14	1.17	1.19
Canada	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
People's Republic of China	4.77	4.80	4.82	4.84	4.85	4.88	4.91	4.94	4.97	4.98	4.98	5.00
Colombia	3.13	3.12	3.15	3.16	3.20	3.23	3.26	3.29	3.32	3.35	3.38	3.41
Egypt	6.97	6.96	6.98	6.99	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
European Union-28	4.42	4.47	4.53	4.57	4.61	4.65	4.69	4.73	4.77	4.82	4.86	4.90
Ghana	1.54	1.59	1.67	1.73	1.79	1.82	1.85	1.88	1.91	1.94	1.97	2.01
Guinea	1.30	1.30	1.33	1.36	1.38	1.41	1.44	1.47	1.50	1.53	1.56	1.59
China - Hong Kong	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
India	2.38	2.36	2.43	2.48	2.52	2.57	2.62	2.66	2.72	2.76	2.79	2.82
Indonesia	3.00	3.01	3.05	3.10	3.14	3.19	3.23	3.26	3.30	3.34	3.37	3.41
Iran	2.86	2.86	2.88	2.91	2.93	2.96	2.98	3.01	3.03	3.06	3.08	3.11
Iraq	2.78	2.80	2.80	2.82	2.83	2.85	2.87	2.88	2.89	2.90	2.91	2.93
Cote d'Ivoire	1.30	1.30	1.32	1.33	1.34	1.36	1.37	1.39	1.40	1.42	1.43	1.45
Japan	4.88	4.90	4.90	4.91	4.92	4.93	4.94	4.95	4.96	4.95	4.96	4.97
Kenya	2.00	2.17	2.39	2.48	2.56	2.62	2.71	2.76	2.82	2.85	2.88	2.92
Lao PDR	1.96	1.89	1.93	1.94	1.95	1.96	1.97	1.99	2.02	2.05	2.09	2.11
Liberia	0.60	0.65	0.71	0.76	0.80	0.83	0.86	0.88	0.90	0.92	0.94	0.95
Malaysia	2.62	2.62	2.64	2.65	2.66	2.69	2.73	2.75	2.79	2.82	2.85	2.89
Mali	2.05	2.02	2.07	2.13	2.19	2.25	2.30	2.35	2.40	2.45	2.50	2.55
Mexico	3.95	3.93	3.94	3.95	3.97	3.99	4.01	4.03	4.04	4.06	4.07	4.07
Mozambique	0.93	0.96	0.99	1.01	1.03	1.04	1.05	1.07	1.09	1.11	1.14	1.17
Myanmar (Burma)	1.79	1.82	1.83	1.85	1.87	1.89	1.90	1.93	1.96	1.99	2.01	2.04
Nigeria	1.05	1.11	1.17	1.22	1.26	1.29	1.30	1.32	1.34	1.36	1.40	1.42
Pakistan	2.42	2.43	2.46	2.49	2.52	2.55	2.56	2.60	2.63	2.64	2.65	2.67
Philippines	2.52	2.57	2.56	2.57	2.57	2.59	2.61	2.65	2.68	2.71	2.74	2.77
Saudi Arabia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Senegal	2.81	2.64	2.72	2.73	2.83	2.91	3.07	3.17	3.25	3.31	3.37	3.44
Sierra Leone	1.16	1.16	1.27	1.33	1.38	1.42	1.45	1.46	1.51	1.54	1.56	1.58
Singapore	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
South Africa	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
South Korea	5.20	5.00	5.06	5.07	5.09	5.10	5.11	5.13	5.14	5.15	5.16	5.18
Taiwan	4.44	4.49	4.49	4.49	4.50	4.50	4.51	4.51	4.52	4.53	4.54	4.55
Tanzania	1.55	1.45	1.47	1.50	1.53	1.55	1.58	1.61	1.63	1.66	1.69	1.71
Thailand	1.83	1.76	1.87	1.89	1.92	1.98	2.00	2.02	2.05	2.07	2.10	2.13
Turkey	4.84	5.10	5.19	5.25	5.31	5.37	5.43	5.48	5.54	5.60	5.66	5.72
United States	5.98	5.86	6.03	6.11	6.18	6.26	6.33	6.38	6.44	6.50	6.56	6.62
Uruguay	6.09	5.80	5.85	5.91	5.96	6.00	6.05	6.09	6.17	6.25	6.33	6.41
Vietnam	3.64	3.70	3.70	3.71	3.73	3.76	3.80	3.81	3.83	3.85	3.87	3.88
Ecowas 7	1.48	1.49	1.50	1.51	1.52	1.53	1.53	1.54	1.55	1.56	1.56	1.57
Cuba	2.12	1.84	2.03	2.05	2.03	2.09	2.08	2.10	2.13	2.15	2.17	2.19
Costa Rica	2.23	2.22	2.20	2.16	2.14	2.11	2.07	2.05	2.02	2.00	1.97	1.95
Dominican Republic	3.32	3.33	3.39	3.44	3.48	3.52	3.52	3.55	3.58	3.60	3.63	3.65
Guatemala	2.30	2.33	2.36	2.39	2.42	2.44	2.47	2.49	2.51	2.53	2.56	2.58
Honduras	2.71	2.76	2.84	2.92	3.00	3.09	3.17	3.25	3.34	3.43	3.51	3.60
Nicaragua	2.78	2.80	2.81	2.84	2.87	2.90	2.93	2.96	2.98	3.01	3.04	3.06
Panama	1.76	1.79	1.83	1.87	1.91	1.95	1.95	1.99	2.02	2.05	2.08	2.11
Chile	3.83	3.86	3.91	3.95	3.99	4.02	4.05	4.08	4.11	4.14	4.17	4.19
Paraguay	4.12	4.05	4.10	4.11	4.13	4.17	4.15	4.15	4.19	4.23	4.27	4.31
Peru	5.38	5.38	5.42	5.48	5.56	5.64	5.69	5.76	5.83	5.90	5.96	6.03
Rest of World	2.10	2.15	2.19	2.22	2.26	2.27	2.29	2.30	2.31	2.34	2.35	2.38
World	2.97	2.97	3.01	3.04	3.07	3.10	3.13	3.16	3.19	3.22	3.24	3.26

Source: Arkansas Global Rice Model, August, 2015.

Table 5. Projected Per Capita Rice Utilization for the World and Selected Countries, 2014-2025

Table 5. Projected Per Capita Rice Utilization for the World and Selected Countries	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
						(Kilograms)						
Argentina	10.3	10.4	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
Australia	15.2	15.5	15.7	16.0	15.7	15.4	15.3	15.3	15.3	15.6	15.3	15.4
Bangladesh	222.1	222.9	222.9	223.3	224.4	225.9	227.6	228.9	230.3	231.7	232.9	233.1
Brazil	39.1	38.9	38.2	38.1	38.0	37.8	37.6	37.6	37.5	37.6	37.6	37.8
Brunei Darussalam	96.9	94.5	96.3	99.3	102.5	104.0	105.9	107.3	108.4	109.5	109.8	111.5
Cambodia	240.1	236.5	239.0	240.8	242.4	244.0	245.2	246.1	246.7	248.0	248.3	248.5
Cameroon	28.6	28.2	30.5	32.7	34.0	35.7	36.6	36.9	37.5	37.9	38.5	39.2
Canada	9.9	10.1	10.4	10.7	11.0	11.1	11.2	11.3	11.4	11.5	11.5	11.6
People's Republic of China	108.5	109.7	108.4	107.7	106.7	105.4	104.7	103.7	103.1	103.1	102.7	102.4
Colombia	32.7	32.3	33.0	33.3	33.7	33.6	33.9	34.1	34.2	34.3	34.3	34.5
Cote d'Ivoire	112.5	109.2	107.7	107.4	107.2	106.9	106.8	106.2	106.0	105.3	105.4	105.6
Egypt	48.0	47.1	46.9	46.9	47.0	46.9	46.7	46.5	46.5	46.7	46.8	47.0
European Union-28	6.4	6.4	6.5	6.5	6.5	6.6	6.6	6.6	6.6	6.7	6.7	6.7
Ghana	36.3	35.9	36.3	37.6	38.8	39.4	40.3	41.0	41.5	42.3	43.1	43.7
Guinea	135.5	130.3	131.5	134.1	136.4	139.0	141.2	143.0	144.8	146.6	148.7	151.7
China - Hong Kong	52.5	57.6	57.4	57.8	57.4	57.1	56.8	56.7	56.5	56.4	56.1	56.0
India	78.3	77.4	77.4	77.4	77.5	77.5	77.5	77.6	77.6	77.7	77.9	78.0
Indonesia	152.7	151.0	149.9	149.2	149.4	149.1	149.0	148.9	148.8	148.9	149.0	149.2
Iran	42.7	41.9	43.2	43.9	44.4	44.8	45.1	45.3	45.6	46.1	46.7	47.0
Iraq	42.6	42.0	42.2	42.3	42.2	42.3	42.7	43.1	43.3	43.5	43.7	44.1
Japan	65.4	66.0	65.2	64.2	63.3	63.0	62.6	62.2	62.0	61.9	61.5	61.3
Kenya	10.9	10.6	10.7	10.9	11.1	11.4	11.8	12.2	12.2	12.3	12.6	13.0
Lao PDR	256.0	253.1	248.2	246.7	242.8	239.2	236.1	233.3	230.9	230.2	229.7	230.0
Liberia	102.0	102.0	101.8	103.3	104.0	105.0	106.9	109.0	111.2	113.3	115.0	117.2
Malaysia	91.1	92.0	91.5	91.4	91.3	91.0	90.5	90.1	89.9	90.1	90.3	90.3
Mali	102.6	101.5	104.8	106.9	108.1	108.8	109.7	110.2	110.0	110.9	111.4	113.1
Mexico	7.2	7.3	7.3	7.3	7.4	7.5	7.5	7.6	7.6	7.6	7.7	7.7
Mozambique	26.6	26.4	26.8	26.9	27.4	27.8	28.6	29.2	29.7	30.3	30.9	31.8
Myanmar (Burma)	164.6	161.7	162.0	161.9	161.6	160.9	160.9	160.8	160.5	160.4	160.3	160.8
Nigeria	35.9	32.6	33.0	33.4	33.6	33.9	34.4	35.0	35.7	36.1	36.7	36.7
Pakistan	15.1	15.2	15.2	15.2	15.1	14.9	14.8	14.7	14.8	14.8	14.8	14.9
Philippines	131.9	130.0	129.7	129.9	129.8	129.8	129.7	129.2	129.1	129.0	129.0	129.3
Saudi Arabia	48.7	50.1	49.9	50.0	50.2	50.4	50.6	50.9	51.1	51.4	51.6	51.8
Senegal	102.8	100.6	100.3	100.5	100.7	100.8	100.9	100.9	101.1	101.2	101.3	101.4
Sierra Leone	152.7	148.0	152.7	155.4	158.7	161.9	164.5	166.4	167.3	169.6	171.1	173.6
Singapore	54.4	54.3	54.5	54.6	54.0	53.5	53.3	53.1	52.9	52.7	52.3	52.2
South Africa	16.8	19.6	19.6	19.7	19.7	19.5	19.4	19.5	19.7	19.7	19.7	20.0
South Korea	89.9	87.7	87.7	87.5	87.5	86.8	86.3	85.6	85.3	85.8	85.7	85.3
Taiwan	38.6	37.3	37.2	36.9	36.7	36.6	36.5	36.4	36.3	36.2	36.0	35.4
Tanzania	33.8	29.1	29.7	30.3	30.6	31.0	31.4	31.6	31.9	32.1	32.4	32.9
Thailand	174.0	177.9	174.2	170.5	168.3	165.8	163.2	161.4	160.7	159.9	158.4	157.8
Turkey	10.3	10.2	10.4	10.4	10.5	10.6	10.7	10.7	10.9	11.1	11.2	11.3
United States	12.9	12.8	13.1	13.2	13.3	13.3	13.3	13.3	13.2	13.2	13.1	13.1
Uruguay	16.1	16.1	15.9	15.9	15.7	15.6	15.6	15.5	15.5	15.5	15.5	15.4
Vietnam	236.6	234.5	231.5	229.7	229.3	227.7	228.7	228.1	227.7	228.1	227.0	226.4
Ecowas 7	35.6	35.0	36.1	37.6	38.3	38.8	39.4	40.0	40.6	41.1	41.6	41.7
Cuba	80.4	78.9	79.6	80.5	80.4	80.6	81.4	81.7	82.1	82.9	83.8	85.2
Costa Rica	50.6	50.3	50.7	50.8	50.7	50.6	50.5	50.4	50.4	50.4	50.1	50.1
Dominican Republic	53.2	51.9	52.1	52.4	52.7	53.0	53.4	53.7	54.1	54.6	55.0	55.4
Guatemala	5.9	6.0	6.0	6.0	6.0	6.1	6.1	6.2	6.2	6.3	6.4	6.4
Honduras	21.2	21.2	20.7	20.7	20.6	20.7	20.8	20.9	21.1	21.3	21.5	21.7
Nicaragua	56.7	57.5	56.7	56.6	56.4	56.3	56.4	56.5	56.7	56.8	57.0	57.1
Panama	58.6	58.0	57.8	57.6	57.3	57.0	56.7	56.4	56.2	55.8	55.4	55.0
Chile	13.0	13.2	13.3	13.4	13.5	13.7	13.8	13.9	14.1	14.3	14.4	14.6
Paraguay	2.9	2.9	2.5	2.5	2.3	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Peru	76.3	76.4	76.8	77.1	77.4	77.8	78.4	78.9	79.3	79.7	80.1	80.5
Rest of World	16.1	16.8	16.8	16.8	16.9	17.0	17.1	17.2	27.8	17.4	17.5	17.5
World	66.3	66.2	65.8	65.6	65.4	65.1	65.0	64.8	64.7	64.7	64.7	64.6

Source: Arkansas Global Rice Model, August, 2015.

TRENDS IN LIBERIA RICE SUPPLY, DEMAND, TRADE

The baseline projected rice balance sheet for Liberia's rice economy is presented in Table 6. Net trade (imports) for Liberia is projected to grow at 2.2% per year increasing from 298 thousand mt in 2015 to 382 thousand metric tons (tmt) by 2025. Consumption is expected to increase by 3.5% per year from 461 tmt in 2015 to 652 tmt by 2025. The domestic production projection reflecting an annual growth of 5.6% is based on an expansion in area harvested of 1.2% per year and an increase in yields of only 4.4% per year. With consumption outpacing production, the dependency on imports lessens marginally from 65% in 2015 to 59% by 2023.

Table 6. Liberia Rice Supply and Utilization, 2014 to 2025

Table 6. Liberia Rice Supply and Utilization	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	(Thousand Hectares)											
Area Harvested	250	252	254	257	260	264	267	271	274	278	281	284
	(Metric Tons per Hectare)											
Yield	0.60	0.65	0.71	0.76	0.80	0.83	0.86	0.88	0.90	0.92	0.94	0.95
	(Thousand Metric Tons)											
Production	149	164	179	196	209	220	231	239	247	255	265	271
Beginning Stocks	23	22	23	28	29	29	30	31	32	33	33	34
Domestic Supply	172	186	202	224	238	249	261	269	278	287	299	305
Consumption	450	461	471	489	504	520	540	563	585	608	628	652
Ending Stocks	22	23	28	29	29	30	31	32	33	33	34	35
Domestic Use	472	484	499	518	533	550	571	594	618	641	663	688
Net Imports	300	298	298	294	295	301	310	325	340	354	364	382

Source: Wailes and Chavez, March 2014.

It is against this baseline projection that the Liberian government must consider the policy sequencing to 1) engage in lifting its supply through area and yield intensification, 2) development of the value chain to meet import competition through quality improvements, and 3) manage trade policy and specifically border protection to ensure reasonable prices for poor Liberian households for their basic food staple and generate protection from relatively cheaper imports to incentivize domestic production. Support to develop successful technology intervention at the farm and processing segments of the rice value chain is being provided by the FED/USAID project and other projects that are designed to contribute to implementation of the proposed rice policy and strategy for Liberia.

As the real FOB price of the international reference Thai 100% B are expected to remain at a level around US$ 400 per metric ton, without a clear and aggressive set of policies and strategy, it will be very difficult for Liberian rice to compete against high quality Indian 5% broken imports[8] (Table 7 and Figure 6). The challenge to develop a competitive rice value chain in Liberia is not insurmountable. The productivity and rice value chain development

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[8] India 5% parboil account for the bulk of Liberian rice imports since 2013. In 2015 this origin and rice type accounted for over 80% of Liberia's rice imports. FOB prices of India IR-64 parboil typically follow closely with the Thai 100%B price.

work by USAID/FED has generated strong evidence that Liberia is capable of competing. However, it is necessary to have a realistic framework to evaluate the current situation against the potential for commercialization of the Liberian rice value chain and an appropriate sequencing of supply lifting, value adding and trade policies.

Table 7. Liberia Imported Rice Prices, FOB, CIF, Retail and Margins, 2011-2015

Year	FOB/MT	CIF/MT	CIF-FOB	Retail/MT	Retail-CIF	Retail Margin
			US$/MT			
2011	493	565	72	691	126	22%
2012	503	576	73	796	220	38%
2013	491	569	78	679	110	19%
2014	479	556	77	637	81	15%
2015 (Jan-Aug)	509	579	70	689	110	19%

Source: Prices are derived from weighted prices by individual import shipments based on Ministry of Commerce & Industry, Rice Statistics; Monthly Retail for Red Light, Monrovia from World Food Program/LISGIS Commodity Prices, simple monthly average.

Figure 6: Monthly Rice Imports, CIF and Retail (Red Light) Prices, 2011-2015
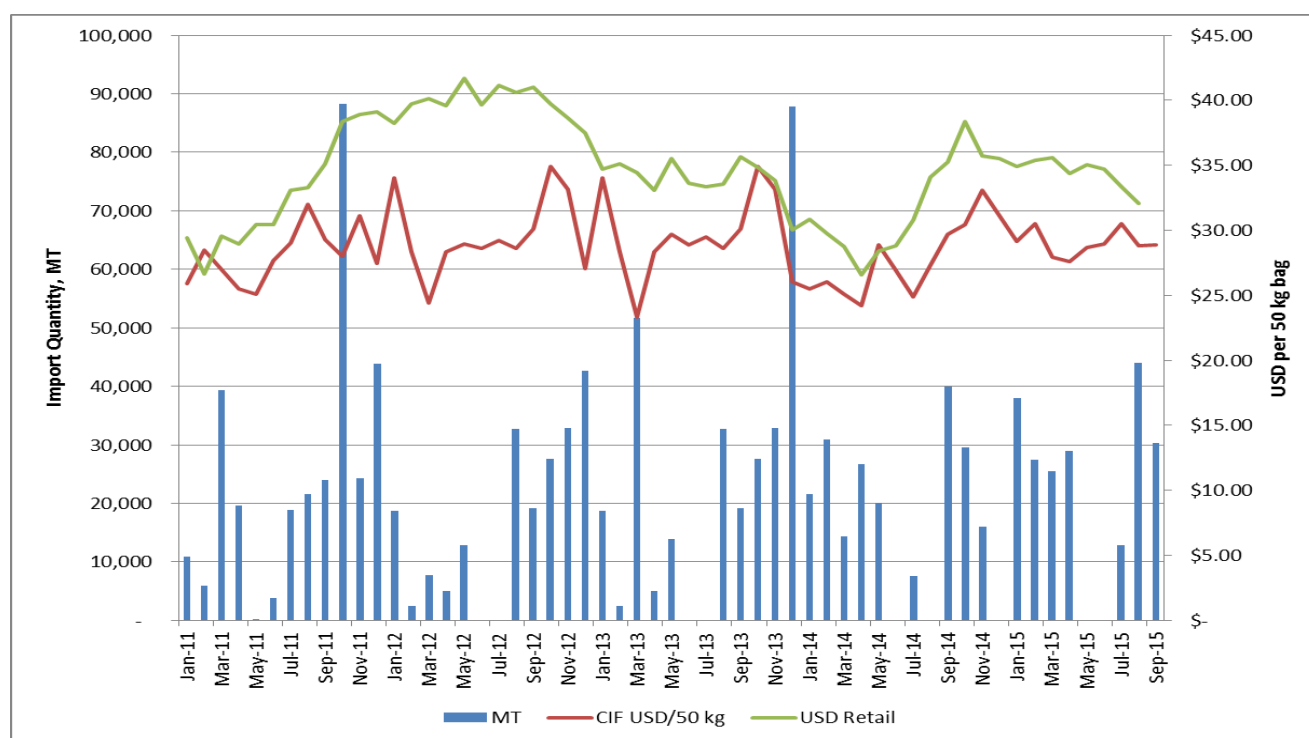
Source: Import quantities and CIF Import prices are compiled from Ministry of Commerce & Industry, Rice Statistics. Monthly retail prices for Red Light are from World Food Program/LISGIS Commodity Prices.

LIBERIA IN THE ECOWAS CONTEXT

Price relationships for imported rice at the port and through to the retail level for Liberia and the rest of the ECOWAS member nations are shown in Table 8. Large price differences

existed among the countries in 2013. Differences are due to primary type and quality of rice imported, differences in tariff rates, country- of-origin, logistical costs, and well as other transaction costs. Negative retail margins for Gambia and Sierra Leone imply consumer subsidies, whereas the large positive margins for Nigeria and Ghana reflect the very high tariff levels applied compared to other nations (Table 9).

Table 8. ECOWAS Import, Wholesale, and Retail Long Grain Milled Rice Prices, 2013 (US$/MT)

					Rate of Markup		
Country	Wholesale	Retail	CIF	Market*	Retail/Wholesale	Retail/CIF	Retail/Market
Benin	769	1049	611	672	0.36	0.72	0.56
Burkina Faso	795	795	537	591	0.00	0.48	0.34
Cote d'Ivoire	516	708	534	588	0.37	0.33	0.21
Gambia	314	314	483	483	0.00	-0.35	-0.35
Ghana	1558	2833	598	718	0.82	3.74	2.95
Guinea	571	571	507	507	0.00	0.13	0.13
Guinea Bissau	628	628	473	520	0.00	0.33	0.21
Liberia		679	501	544		0.36	0.25
Mali	676	1275	712	784	0.89	0.79	0.63
Niger	893	1100	655	721	0.23	0.68	0.53
Nigeria	630	1899	590	1239	2.02	2.22	0.53
Senegal	498	870	463	510	0.75	0.88	0.71
Sierra Leone	398	398	452	497	0.00	-0.12	-0.20
Togo	575	970	549	604	0.69	0.77	0.61

Source: RiceFlow Model; GIEWS, FAO; Comtrade/UN

*Market price is at the port after tariff, unloading, warehouse and handling costs.

IMPACT OF THE CET ON LIBERIA, WORLD PRICES, AND ECOWAS TRADE

To compare the impact of moving to the 10% CET for rice within the ECOWAS region, the Arkansas Global rice model has been utilized to simulate the impact of implementation of the CET on January, 2016. Current tariffs for 2015 are given in Table 9 as a comparison to the CET.

Table 9. ECOWAS Member Rice Tariffs in 2015 and the Proposed CET

Country	2015 Import Tariff	ECOWAS CET 10%
Benin	35%	10%
Burkina Faso	10%	10%
Cote d'Ivoire	10%	10%
Gambia	0%	10%
Ghana	37.4%	10%
Guinea	10%	10%
Guinea-Bissau	10%	10%
Liberia	0% (US$ 0.44/kg)	10%
Mali	10%	10%
Niger	10%	10%

Nigeria	50% (30% if invested, 70% if not invested)	10%
Senegal	22.7%	10%
Sierra Leone	5%	10%
Togo	10%	10%

Source: WTO Tariff database, USDA FAS GAIN reports.

The following tables provide projected estimates for Liberia's rice economy assuming that Liberia and all other ECOWAS countries impose the 10% CET on rice imports. Tables 10 and 11 present estimates of the impact on Liberia measured as changes in levels and percentages, respectively, from the baseline levels in Table 6. The major impact on Liberia is the reduction in rice imports. Imports become more expensive not only because of the change from a zero tariff to the 10% but because as the other countries, notably Ghana and Nigeria, reduce their tariffs and consequently import more rice, world import prices for Liberia increase by about $US 5/mt as shown in Table 12.

Table 10. Impact of 10% CET on Liberia rice economy, change from Baseline

Variable	Units / Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Area Harvested	1000 ha	0.0	0.0	0.5	1.0	1.4	1.7	2.0	2.3	2.5	2.7	2.9
Yield	mt/ha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Production	1000 mt	0.0	0.0	0.4	0.8	1.1	1.5	1.8	2.0	2.3	2.5	2.7
Per Capita Use	kg	0.0	-4.0	-4.2	-4.3	-4.3	-4.4	-4.5	-4.6	-4.7	-4.8	-4.9
Total Consumption	1000 mt	0.0	-18.7	-20.0	-20.8	-21.5	-22.5	-23.3	-24.3	-25.2	-26.1	-27.1
Net Imports	1000 mt	0.0	-19.5	-20.4	-21.6	-22.6	-24.0	-25.1	-26.4	-27.6	-28.7	-29.9
Ending Stocks	1000 mt	0.0	-0.7	-0.8	-0.8	-0.8	-0.9	-0.9	-0.9	-1.0	-1.0	-1.0

Source: Wailes and Chavez. Arkansas Global Rice Model, October, 2015

Table 11. Impact of 10% CET on Liberia rice economy, percent change from Baseline

Variable	Units / Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Area Harvested	Percent	0.00	0.00	0.20	0.37	0.52	0.64	0.74	0.83	0.90	0.96	1.01
Yield	Percent	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Production	Percent	0.00	0.00	0.20	0.37	0.52	0.64	0.74	0.83	0.90	0.96	1.01
Per Capita Use	Percent	0.00	-3.98	-4.08	-4.12	-4.13	-4.16	-4.15	-4.15	-4.15	-4.16	-4.15
Total Consumption	Percent	0.00	-3.98	-4.08	-4.12	-4.13	-4.16	-4.15	-4.15	-4.15	-4.16	-4.15
Net Imports	Percent	0.00	-6.54	-6.95	-7.31	-7.52	-7.72	-7.73	-7.76	-7.79	-7.89	-7.82
Ending Stocks	Percent	0.00	-2.56	-2.67	-2.72	-2.75	-2.81	-2.84	-2.87	-2.91	-2.94	-2.97

Source: Wailes and Chavez. Arkansas Global Rice Model, October, 2015

The consequence of reduced imports is a reduction in the availability of the major food staple, reducing total rice consumption by 4%. This impact will be adversely related with household income, affecting the poorest households most severely. Without investments in supply lifting technologies to improve yields, increases in production are marginal with the major effect being to induce approximately three thousand more hectares of land into rice production. Table 11 shows the percent change from the baseline levels in Table 6.

Table 12. Impact of ECOWAS 10% CET on World Long Grain Reference Price, 100%B Thai

Scenario	Units / Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Baseline	US$/mt	386.28	438.11	445.74	470.35	488.37	498.37	503.67	508.23	513.63	523.44	527.14
10% CET	US$/mt	386.28	440.65	449.45	474.78	493.06	503.47	508.71	513.37	518.86	528.85	532.53
Change	US$/mt	0.00	2.53	3.72	4.43	4.69	5.10	5.04	5.13	5.24	5.41	5.40
% Change	Percent	0.00	0.58	0.83	0.94	0.96	1.02	1.00	1.01	1.02	1.03	1.02

Nigeria, Senegal and Ghana have currently higher levels of trade protection than the 10% CET. As a consequence, net imports and trade dependency will increase and more than offset the remaining member nations, including Liberia, who will have lower imports because of a higher CET tariff compared to current protection and because of a higher world import price. Some of these countries will be able to offset the reduction in imports with increases in domestic production where the rice production sectors that are in a position to benefit from an increase in tariff protection. Unfortunately, without an appropriate policy sequencing of technology and infrastructure support for Liberia's domestic rice sector, the 10% CET will adversely affect Liberia and particularly its poorest households.

Table 13. Impact of 10% CET on Net Rice Imports for ECOWAS and Selected Members

Country	Units / Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Nigeria	(1000 mt)	0.0	210.4	253.3	269.4	281.1	292.0	305.2	318.6	330.7	343.9	354.0
Senegal	(1000 mt)	0.0	2.1	15.2	21.9	24.8	27.3	28.5	29.2	29.8	30.3	30.8
Ghana	(1000 mt)	0.0	1.2	46.3	91.2	132.2	169.1	203.5	235.5	265.1	292.8	318.9
Cote d'Ivoire	(1000 mt)	0.0	-3.3	-6.3	-8.2	-9.1	-10.1	-10.5	-10.9	-11.2	-11.6	-12.0
Guinea	(1000 mt)	0.0	-2.0	-3.0	-3.7	-4.1	-4.8	-5.2	-5.7	-6.2	-6.8	-7.2
Sierra Leone	(1000 mt)	0.0	-11.0	-11.5	-12.1	-12.6	-13.1	-13.5	-13.8	-14.3	-14.7	-15.2
Mali	(1000 mt)	0.0	-3.3	-5.6	-7.1	-8.0	-8.9	-9.3	-9.7	-10.2	-10.6	-11.0
Liberia	(1000	0.0	-19.5	-20.4	-21.6	-22.6	-24.0	-25.1	-26.4	-27.6	-28.7	-29.9

	mt)										
Others	(1000 mt)	0.0	-1.6	-3.6	-5.4	-6.9	-8.3	-9.3	-10.2	-10.9	-11.6	-12.1
Total ECOWAS	(1000 mt)	0.0	173.0	264.4	324.5	374.8	419.2	464.3	506.5	545.2	582.9	616.3

POLICY ENVIRONMENT ASSESSMENT FOR LIBERIA RICE VALUE CHAIN

POLICY ISSUES FOR LIBERIA RICE

A basic challenge for Liberia is get the appropriate sequencing of rice policies. The primary food security objective for rice policy is to provide Liberian consumers with a reliable, nutritious, and affordable food staple. The global rice crisis of 2008 and the more recent Ebola crisis have reinforced the notion that reliance on imported rice is a risky solution to achieving the nation's primary food security objective. To avoid the price volatility and unpredictable availability from the global market, Liberia must reestablish a vibrant domestic rice economy, capable of competing with imported rice. At the same time, a reliable availability of rice is no guarantee against the "hidden hunger" that is endemic in all countries where milled rice is the main source of calories. Deficient in minerals and micronutrients, rice may fill the belly, but without a diversified diet, consumers suffer from stunting, anemia, night blindness, spina bifida and many other diseases. In addition to diversification of the diet, fortification of rice through parboiling, coating, or addition of extruded fortified rice kernels can help address the "empty calorie" rice diet. Finally, an affordable and sustainable domestic rice supply can only be achieved by improving the productivity of the Liberian rice sector. Liberia has the resource endowments for a comparative advantage for rice production including plentiful rainfall, available labor, traditional knowledge and history of rice production. The missing elements are a lack of market and processing infrastructure, weak research and extension capacity, and limited producer/industry organization. Scaling up to achieve competitive supply of domestic rice production is possible but will depend on the Government of Liberia following an appropriate set of policies.

Liberia needs a sequence of:
1) rice policies that will improve farm level productivity through development of a private market value chain that supplies critical inputs such as certified seeds, fertilizers and pesticides;
2) rice policies that develop capacity for public rice research and extension;
3) rice policies that lead to private-public partnership investments in production and marketing infrastructure including irrigation systems and rehabilitation of lowlands, transportation/distribution, and rice processing facilities.

Improving farm level productivity will result in marketable surpluses. However, if this surplus production cannot be competitively marketed by reducing post-harvest losses and improving rice quality, then farm level productivity gains will have limited value. Finally, as a member of

ECOWAS, Liberia faces the challenge of imposing a 10% tariff on rice imports. If expansion of domestically supplied rice cannot offset or limit the costs of this tariff for poor Liberian households, social and political turmoil may well result. So the challenge of Liberia's rice policy sequencing is to expand domestic production and improve the quality to be competitive with imported rice. The following policy analysis proposes a sequence of rice policies that can achieve the food security objective of Liberia. It relies on the experience and progress achieved by the USAID Food and Enterprise Development (FED) project.

USAID/FED strategy for upgrading the rice value chain has several elements including input supply enterprise development, farmer group demonstration trials of improved technologies for upland and lowland rice production, value enhancing through rice business hubs and partnering with support for larger scale commercial rice mills.

With regard to input supply, most critical is the national seed development policy and infrastructure. USAID/FED demonstration rice production trials show that use of improved seeds has a significant impact on producers' yields. The national strategy to develop the national seed infrastructure to produce and market improved rice varieties for rice producers have been initiated.

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). This proposal has now been endorsed by the government and legislation to authorize the framework is being finalized. This is important 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. Rice seed quality assurance and certification training was provided in March/April 2014 by USAID/FED in collaboration with the Central Agricultural Research Institute (CARI) and Africa Rice.

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 establishment of a soils test laboratory at CARI in 2015 is an important development.

COSTS OF DEVELOPMENT OF UPLAND RICE AND LOWLAND RICE

USAID FED has used both upland and lowland demonstration sites to develop increased productivity and profitability of the rice value chain. The key productivity improvements include 1) use of fertilizers, 2) plant spacing, 3) use of certified rice seed, 4) use of mechanized tillers for lowland preparation, and 5) investment in spillways to control

irrigation during the wet season. A survey of farmers (n=295) who have participated in the demonstration sites to improve productivity suggests that new technologies have increased household rice production, consumption, sales and purchases (Table 14). The data show that the farm households increased marketable surpluses over time, improved household rice consumption, and accessed the market to purchase rice rather than rely on household supplies.

Table 14. USAID FED Demonstration Rice Farms, Production, Consumption, Sales and Purchases

Year	Production	Consumption	Sales	Implied Purchases	Unit Price	Sales Value
	----------------------50 KG. BAGS PADDY----------------------				LIBERIAN DOLLARS	
2012	18.00	12.92	6.25	1.17	1,059	6,621
2013	23.54	15.55	8.18	0.19	1,647	13,471
2014	30.99	19.28	16.80	5.19	921	15,474

Source: Project survey data.

Cost of production and yield estimates from the demonstration FED and non-FED farms provide a basis to also measure the efficiency value of improved technology on rice farms (Table 15). Cost efficiency based on costs differences between FED and Non-FED rice farms is shown to be improved for lowland paddy rice by US$ 63/MT and for upland paddy rice by US$ 152/MT. The cost efficiency gains are derived from two primary sources. On upland farms costs are reduced from farm yield improvements by US$ 5.19/bag, assuming 30% post-harvest losses. If in addition the FED farm achieves a post-harvest loss of only 15%, then costs of production are reduced an additional US$ 2.42/bag. Rice from FED lowland rice is estimated to have a competitive cost advantage above FED upland FED rice of US$ 49/mt.

Gains from reduced post-harvest losses are assumed to be achieved by improving the harvest through mechanization and marketing infrastructure with the development of rice business hubs which provide for improved drying, paddy storage, milling, and clean rice storage. At the end of 2014, the FED project had developed 10 rice business hubs and in 2015 will develop an additional 9 hubs for 2015.

Table 15. Summary Comparison of FED and Non-FED Rice Farms, Yields and Costs

Description	FED Rice Farms	Non-FED Rice Farms	Difference
Upland Rice Farms	US Dollars		
Costs per hectare			
Labor	207.50	160.00	47.50
Inputs	267.50	51.40	216.10
1st Year Land preparation depreciation*	4.15		4.15
Total costs per hectare	479.15	211.40	267.75
Field Yield per Hectare	2,500 kg	800 kg	1,700 kg
Cost/50 kg bag paddy	9.58	13.21	-3.63
Net Yield per Hectare (30% post-harvest loss)	1,750 kg	560 kg	
Net Cost/50 kg bag (30% post-harvest loss)	13.69	18.88	-5.19
Net Yield per Hectare (15% post-harvest loss)	2,125 kg	kg	1,565 kg
Net Cost/50 kg bag (15% post-harvest loss)**	11.27	18.88	-7.61
Lowland Rice Farms	US Dollars		
Costs per hectare			
Labor	170.00	147.50	22.50
Inputs	366.90	53.20	313.70
Custom Services (Tiller, threshing)	125.24		125.24
1st Year Land preparation Depreciation*	12.22		12.22
Total costs per hectare	674.36	200.70	473.66
Field Yield per Hectare	4,500 kg	1,200 kg	3,300 kg
Cost/50 kg bag paddy	7.49	8.36	-0.87
Net Yield per Hectare (post- harvest loss)**	3,825 kg	840 kg	2,985 kg
Net Cost/50 kg bag paddy (post-harvest loss)	8.82	11.95	-3.13

*Based on difference in 1st and subsequent year production costs, using a 20-year depreciation schedule.
** Assumes a 30% post-harvest loss for traditional rice farm and lower 15% loss for FED improved farm.

COSTS OF DEVELOPMENT OF RICE BUSINESS HUBS

Private sector development of the rice processing sector will be a critical component of the Liberian rice sector development strategy. Trade policies which allow for duty-free imports of basic machinery including rice mills, power tillers, de-stoners and threshers will be an important investment incentive to develop the capacity to process the marketable rice surplus that can be expected from the farm sector. This investment will provide both rice output and economic gains by reducing post-harvest losses, improving milling conversion rates and providing the market interface needed for domestic rice to compete with imported rice.

Figure 7: Domestic (country) rice package from participating FED Rice Business Hub

Table 16 provides the FED estimated investment costs associated with the 19 rice business hubs that the project has developed in 2014 and 2015. The rice business hub concept provides a delivery location for farmers to sell their paddy. It also can provide the collateral needed to own and provide custom mechanization with tillers and threshers for small farmers who otherwise cannot afford these investments.

Table 16. Estimated Investment Costs of Rice Business Hubs

Description	Unit Cost (US$)	Annual Depreciation (US$)	Year of Life	Annual Required Maintenance (ARM%)
Infrastructure (building and drying floor)	33,869	1314.76	25	0.5
Power tiller	4,300	430.00	10	3.0
Rice mill	3,325	277.08	12	3.0
De-stoner	3,650	304.17	12	1.0
Thresher	675	67.50	10	3.0
Total cost	45,819	2,393.51		

Source: Based on rice mill cost models by Wailes and Holder (1987) and personal communication, Agnes Luz

The rice hub milling facility is designed to process 750 kg of paddy per hour. Operating cost data facilities are given in Table 17.

Table 17. Operating costs for Rice Business Hub Mill

Cost Item	Rice Business Hub for 750 kg/hour, 245 days, one 8-hour shift*	Rice Business Hub for 750 kg/hour, 245 days, two 8-hour shifts**
Ownership Fixed Costs	Costs per 50 kg bag milled, (US$)	
Building and drying floor	0.04	0.02
Mill and de-stoner	0.02	0.01
Power tiller and thresher	0.02	0.01
Total Fixed Costs	0.08	0.04
Operating Costs		
Administrative and clerical***	0.37	0.37
Direct Labor	2.24	2.24
Fuel	1.07	1.07
Transportation	2.68	2.68
Pest Control	0.02	0.02
Packaging	0.59	0.59
Repairs and maintenance****	0.02	0.02
Other operating costs	0.01	0.01
Interest on working capital*****	0.35	0.35
Total Operating Costs	7.35	7.35
Total Ownership and Operating Costs	7.43	7.39

*Yearly milled rice processed is 29,400 50-kg bags (1,470 MT)
**Yearly milled rice processed is 58,800 50-kg bags (2,940 MT)
***Overhead costs
****Repairs and maintenance calculated from ARM% in Investment costs
*****Interest on working capital is assumed to be 5% on sum of operating costs.
Source: Based on rice mill cost models developed by Wailes and Holder (1987)

Pricing of Liberian rice to compete with imported rice will depend up the following factors:

1) Farm level production costs
2) Milling costs
3) Premium/discounts Liberian consumers are willing to pay for domestic quality compared to import quality.

As Liberia transitions from traditional rice production to improved upland and lowland rice production, per unit costs will decrease as a result of higher field yields and lower post-harvest losses as presented in Table 15. Additional field trial evidence of the potential of the impact of improved variety seeds, cultural practices (plant spacing) and inputs (UDP-urea deep placement) on output and cost reduction have been summarized by Atkinson (August, 2015).

Table 18. FED Field Trial results fertilizer and plant spacing, 2015

Direct Costs		Fertilizer Applications		
		UDP (T[1])	Broadcast (T[2])	Zero (T[3])
MATERIALS - INPUTS & EQUIPMENT				
A	SEEDS	45.00	75.00	75.00
B	FERTILIZER	153.50	262.18	0.00
C	CHEMICALS			
D	EQUIPMENT & TOOLS	28.25	21.25	21.25
LABOUR				
A	LAND PREPARATION	40.80	36.00	36.00
B	PLANTING	13.20	8.40	8.40
C	FERTILIZER APPLICATION	14.40	14.40	
D	CHEMICAL APPLICATION			
E	CROP MAINTENANCE	6.00	6.00	6.00
F	HARVESTING, DRYING & THRESHING	34.50	31.65	32.40
G	TRANSPORTATION (INPUTS & HARVEST)	198.93	154.08	60.00
H	STORAGE	17.16	12.98	5.28
	Total	551.74	621.94	244.33

SUMMARY

	UDP	Broadcast	Zero
Costs/ha	$ 551.74	$ 621.94	$ 244.33
Yield kg/ha	3900	2950	1200
Cost US$/50kg	$ 7.07	$ 10.54	$ 10.18
Selling price at Farm Gate Price (FGP)($12/50kg)	$ 12.00	$ 12.00	$ 12.00
Income US$/ha	$ 936.00	$ 708.00	$ 288.00
Gross Profit US$/ha	$ 384.26	$ 86.06	$ 43.67

	Input Cost/ha	Yield/ha	Gross Profit/ha
Lowland UDP vs Broadcast	-12.7%	32.2%	346.5%
Lowland UDP vs Zero Fertilizer	125.8%	225.0%	779.9%

Source: USAID/FED, Quarter Three Report, April-June 2015 based on seminar presented by Steve Atkinson, July 15, 2015.

Additional gains in productivity are projected to be achieved as a result of rehabilitation of lowland rice production. The Rapid Rural Appraisal Report by USAID/FED (August, 2015) indicates for the four county rice project area (Bong, Grand Bassa, Lofa, and Nimba) that there are 22,818 hectares with potential for lowland rice cultivation. The FED project target for 2015 for improved/rehabilitated lowland rice areas is 5,427 hectares or 24 percent of the total potential area (Quarterly Report, April-June 2015).

COMPETITIVENESS ANALYSIS OF DOMESTIC RICE TO IMPORTED RICE

When we consider the farm levels costs, post-harvest losses, milling rates and milling costs, it is possible to evaluate how competitive the Liberian rice sector can become with productivity improvements. However there still remains the issue of quality and willingness

of consumers to pay a premium or discount for domestic rice compare to imported rice. This aspect is analyzed in the following table.

Table 19. Potential pricing competitiveness of Liberian rice compared to imports

Description	Improved Technology	Traditional Technology
Upland production	US Dollars	
Cost of production, 50 kg paddy bag	$11.27	$18.88
Cost of production, 50 kg milled bag, 65% outturn	17.34	29.05
Milling cost	7.40	4.00
Milled rice cost, 50 kg bag, ex mill	24.74	33.05
CIF, Imported Rice, 50 kg bag	27.94	27.94
Domestic Cost Advantage, 50 kg bag	3.30	- 5.11

The costs of improved technology at the farm level and through the value chain generate a cost advantage of domestic rice (ex business hub mill) of US$ 3.30 per 50 kg bag over the CIF import price. As a result of transportation costs, this cost advantage increases for consumers located further from the port and closer to the domestic rice mill and decreases for consumer located closer to the port and further from the domestic rice business hub. However, the US$ 3.30 provides a margin over imported rice to offset quality discounts that the consumer may require to purchase domestic rice compared to imported rice. Unfortunately, no consumer willingness to pay experimental study has been conducted to measure the premium/discount required for domestic rice relative to imported rice. Nevertheless, this analysis offers a framework to assess the extent to which the domestic industry can price competitively relative to imported rice.

To summarize, the policies that are necessary to develop a competitive domestic rice supply include the following:

1. Policies that ensure the development of improved and certified seed varieties. Adoption of Seed Law and Regulations
2. Policies that create trade standards for fertilizer and pesticide supplies including Labeling Laws and Quality Assurance.
3. Trade policies that allow for zero tariffs on production inputs (fertilizers, pesticides, seeds) and production equipment (tillers, threshers, mills, and grain dryers). Executive Order #64.
4. Policies that provide investment incentives for entrepreneurs to develop rice business hubs, input supply business and rice distribution and wholesaling businesses. This would include tax holidays and other business incentives.

Given this policy environment, the expected time-line for the domestic rice sector development would follow as indicated in Table 20. The baseline assumes that no accelerated productivity investment is pursued other that what has been trend for the past 10 years. This baseline projects by 2025 that area harvested will increase by 30 thousand

hectares, approximately 1% per year. Average per hectare milled yields will increase from 0.71 mt/ha to 0.95 mt/ha by 2025, a 3% annual increase. The combination slight area expansion and yield growth generates an estimated increase over the baseline in production from 179 thousand mt in 2016 to 271 thousand mt by 2025. With total rice consumption in Liberia projected at 652 thousand mt by 2025, the country is expected to remain heavily dependent on imports of 372 thousand metric tons and a CIF import cost of US$ 230 million (Tables 3, 6 and 7).

Table 20. Productivity Analysis for Liberia Rice Supply, 2016-2025

Item	Units	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Baseline											
Area Harvested	'000 ha	254	257	260	264	267	271	274	278	281	284
Lowland	'000 ha	25	26	26	26	27	27	27	28	28	28
Upland	'000 ha	228	231	234	237	241	244	247	250	253	256
Yield	MT/ha	0.71	0.76	0.80	0.83	0.86	0.88	0.90	0.92	0.94	0.95
Production	'000 MT	179	196	209	220	231	239	247	255	265	271
Productivity Scenarios											
Area Harvested	'000 ha	254	257	260	264	267	271	274	278	281	284
Lowland Improved	'000 ha	5	8	11	13	16	18	21	23	26	28
Lowland Traditional	'000 ha	20	18	15	13	11	9	7	4	2	0
Upland Improved	'000 ha	3	31	59	87	115	143	171	199	228	256
Upland Traditional	'000 ha	226	200	175	150	125	101	76	51	25	0
Wtd. Milled Yields*	MT/ha	0.73	0.87	1.00	1.13	1.25	1.37	1.48	1.60	1.71	1.81
Lowland Imp Yield	MT/ha	2.925	2.925	2.925	2.925	2.925	2.925	2.925	2.925	2.925	2.925
Lowland Trad Yield	MT/ha	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Upland Imp Yield	MT/ha	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625
Upland Trad Yield	MT/ha	0.624	0.624	0.624	0.624	0.624	0.624	0.624	0.624	0.624	0.624
Milled Production*	'000 MT	187	226	265	305	344	383	423	462	501	540
Wtd. Milled Yield**	MT/ha	0.75	0.90	1.04	1.17	1.30	1.42	1.53	1.65	1.76	1.86
Milled Production **	'000 MT	195	238	281	324	367	410	453	496	539	582

*Assumes improved lowland rice area is harvested 1.5 times per year.
**Assumes improved lowland rice area is harvested 2.0 times per year.

Accelerated productivity on rice farms based on the USAID/FED project is evaluated in Table 20 with an assumption that rehabilitation investment in lowland rice areas reaches a potential area of 28 thousand hectares by 2025. Further productivity improvement on upland rice farms is achieved on 256 thousand hectares by 2025. Yield improvement occurs as a result of expansion in areas under improved production technologies.

Expansion in area harvested depends on the intensity of double rice cropping on the lowland improved area. With a 1.5 cropping intensity of improved lowlands area harvested increases

annually by 1.7% reaching total rice area 298 thousand hectares. Milled yields increase annually by 10.3% and average 1.81 mt/ha by 2025. Milled production increases to 540 metric tons and reduces the dependency on imported rice to only 112 thousand metric tons.

With greater double-cropping intensity on all improved lowland rice areas harvested area increases annually by 2.1% to a level of 313 thousand hectares by 2025. Milled yields increase annually by 10.4%, resulting in an annual production growth rate of 12.5%. Milled production increases to 582 thousand mt and imports decline to a level of only 70 thousand metric tons for an import bill of $42 million.

PRIVATE AND PUBLIC GOVERNANCE AND FINANCING IMPLICATIONS

Achieving the expansion in Liberia's rice output based on the productivity scenarios developed in Table 20 will be an extraordinary achievement. It will require a concerted commitment by both the Government of Liberia and the private sector to make the necessary investments. In order for the required investments to be sustainable, the government policies for zero tariffs on specified agricultural inputs and machinery will be necessary. Furthermore, passage of the Seed Law and associated labelling, certification and quality assurance for fertilizers and pesticides will be necessary. Rehabilitation of lowland areas will require capital expenditures of at least $300 per hectare. Total cost for the additional 23,000 lowland hectares will be US$ 7.8 million. Water control through construction of spillways will require 460 units at a cost of US$ 4,660 per unit or a total cost of US$ 2.2 million. Rice business hubs must be built and sequenced with marketable surpluses for a total cost of US$ 29 million. Total 10-year investment requirements are US$ 39.2 million. Table 21 provides an estimated time-line of financial requirements.

Table 21. Financing Requirements for Scaling-up Rice Value Chain

Item	Unit	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Improved Lowland area	Ha	5,427	7,981	10,535	13,089	15,642	18,196	20,750	23,304	25,858	28,412
Development costs*	US$		766,153	789,137	812,811	837,196	862,312	888,181	914,826	942,271	970,539
Spillways**	US$		237,660	244,790	252,133	259,697	267,488	275,513	283,778	292,292	301,061
Rice Business Hubs*	US$	466,052	2,811,483	2,895,828	2,982,702	3,072,184	3,164,349	3,259,280	3,357,058	3,457,770	3,561,503
Total Investment Requirements	US$	466,052	3,815,296	3,929,755	4,047,647	4,169,077	4,294,149	4,422,974	4,555,663	4,692,333	4,833,103

*Lowland development costs are estimated at $300/ha with an annual inflation of 3% over the time horizon.
**Irrigation spillways/50 hectares on improved lowlands investment requirement of $4,660 with annual inflation of 3%.
***Rice business hubs estimated annual out-turn of 1,470 mt per hub with investment of $45,819/hub plus 3% annual inflation.

RECOMMENDATIONS FOR THE FED RICE PROGRAM

FED RICE PROGRAM OVERVIEW

The major objectives of the FED rice program include: Component 1—increase productivity and profitability of rice; Component 2—stimulate private enterprise growth and investment; and Component 3—build local technical and managerial human resource capability. The FED project recognizes that there are significant challenges. The Liberian rice sector lacks competitiveness because of widespread upland, subsistence and fragmented production, highly manual and labor intensive production practices, high costs of production due to escalating labor costs, high transport costs associated with poor road conditions and high cost of fuel, and undeveloped and inefficient input markets. Dependency on imports is a result of a lack of sufficient production incentives and supporting institutions needed to stimulate production. Lack of credit and more attractive investment alternatives cause private sector funds to move to more profitable sectors in agriculture (rubber, cocoa and oil palm) and non-agriculture enterprises.

FED supports the vision of the Liberian National Rice Policy Strategy. While the objective to become self-sufficient as discussed above is overly ambitious, Liberia has the resource potential of to develop lowland areas and develop the land productivity on both existing upland and lowland rice areas.

FED's rice value chain development strategy includes tapping into the resource potentials and addressing the production, processing and storage, and marketing challenges. This strategy was presented at the symposium and includes the following objectives and activities:

- Improve productivity of upland and expand lowland production areas
- Support strategic market players (input suppliers and processors)
- Increase regional and peri-urban rice milling business hubs
  - Set-up collection centers/ storage facilities in strategic locations
- Support farmer groups in rice production clusters
- Prioritize farming groups with experience, group solidarity, and capital
- Promote mechanization on a fee-for-service basis
- Provide business training to farmers and entrepreneurs
- Link farmer groups to savings and loan opportunities

RECOMMENDATIONS

The project is entering its final year having established a significant degree of progress and impact on the rice value chain. Productivity improvements of both lowland and upland rice production have been demonstrated. Improved cultural practices including use of improved rice varieties, plant spacing, fertilization, and pesticide use can increase the average milled yields on the aggregate of upland and lowland areas from 0.7 mt/ha to nearly 2 mt/ha.

The policy challenge is to sequence investments in scaling up the rice production sector with investments in rice processing and distribution so that Liberian rice can be priced competitively with imported rice. One of the key questions not addressed by the FED project is what is the premium/discount that consumers are willing to pay for improve domestic quality rice relative to parboiled India rice imports.

Estimates presented in this report suggest that with productivity improvements, Liberia rice can be cost competitive with import prices. But there is insufficient knowledge about the consumer's willingness to switch to domestic rice away from imported quality. Therefore one of my key recommendations is for the project to conduct experimental choice studies to evaluate the extent of quality enhancement that will be needed to meet consumers' expectations. If consumers do not prefer the domestic rice, a price differential will develop and profitability for Liberia rice production will dissipate.

The second recommendation of this study is for the Government of Liberia. Every effort should be taken to delay the imposition of the 10% CET of the ECOWAS on rice imports until levels of success on production and quality improvement are achieved. Rice is critically important to the economic and nutritional well-being of the Liberian household and therefore for the political stability of the country. An investment of US$ 40 million to achieve a more secure and stable domestic supply of rice is well worth the welfare loss to consumers of a 10 tariff on rice and ability to avoid political instability.

The final recommendation is for the project to consider a follow on project to extend and solidify the expertise developed from this project. The primary purpose should be the scaling up of the demonstrated progress and lessons learned from this project. Human capital investments in the development of improved farm level technologies, value chain development, training expertise, and institutional knowledge are not easily valued but must be recognized as worth maintaining to sustain the progress achieved from this project.

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

> "Rice is 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 policy sequencing, the analysis suggests the Government of Liberia should carefully consider the consequences for supply shifting, valuing adding and trade policy.

The USAID/FED rice production strategy is dependent on imported mechanization and use of improved purchased and imported inputs such as fertilizers and pesticides. Therefore the first recommendation of this report is:

1. Maintain EO #64 for targeted rice production inputs that are critical for a sustained supply shift involving improved rice seeds, fertilizer and pesticides, mechanization and investment in lowland rice production areas, and equipment and machinery needed for rice drying, storage and milling. The project should develop a list of inputs it views as essential to sustain and grow the rice production sector.

Until the USAID/FED technology packages are fine-tuned and deliverable to a larger number of farmers, the supply shifting impact will be limited. However, the Government of Liberia must begin to invest heavily in the technology diffusion strategies necessary to mobilize this technology package to ensure widespread education and adoption of improved techniques. This will require the infrastructural development of rural input markets. It will also require the strategic private-public investment in value adding enterprises such as rice drying, parboiling, storage and milling. As such, the cluster approach as adopted by the USAID/FED project is appropriate in developing more optimal timing, size and location of the post-harvest facilities. Therefore the second recommendation of this report is:

2. Using a spatial optimization programming technique an economist should be hired evaluate alternative and likely production shifting/value adding strategies to guide appropriate private-public sector investment by the Government of Liberia and the USAID/FED project.

Not until there is momentum in achieving a reversal in the declining self-sufficiency ratio for rice, should the government consider the imposition of the 10% CET on rice imports. The economy is too fragile, with too much of the population living in poverty to subject them to a serious loss in their meager purchasing power. Therefore the third and final recommendation of this report is:

3. Seek a waiver in ECOWAS for the 10% CET for rice until such time that the self-sufficiency ratio (SSR) for rice has been sustained for a period of at least three years at the 50% level. Ideally, the SSR should show a sustained upward trend.

The price transmission and spatial price integration study presented in Wailes (2014) highlights the importance of investing in transportation infrastructure. The key finding that it

takes over five months on average to transmit rice prices from major wholesale markets to interior markets reflects a high degree of inefficiency in the market environment.

ANNEX I. RICE VALUE CHAIN POLICY ENVIRONMENT ASSESSMENT - SOW

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

Title: Rice Policy Expert

Location: Home Based & Monrovia, Liberia

Period of Performance: Sep 14 – Oct 15

LOE Required: 20 Days (11 Working Days in Country, 7 Home Based, 2 travel days inclusive of 6-day work-week)

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. USAID FED is focused on four priority counties (Grand Bassa, Bong, Nimba and Lofa) and two secondary counties, (Magribi and Montserrado). USAID 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 USAID 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.

As part of Component 2 FED is working to support key institutions of the Government of Liberia (GoL) to develop the technical capacity in order to identify, formulate, and implement policies and practices that facilitate the growth of the private sector's role in enhancing food crop agriculture. In this regard FED recognizes that to be effective in developing policies that support the growth of domestic agribusiness, the GoL need access to Subject Matter Experts who can provide them with evidenced based advice as part of their policy formation process. USAID FED has been instrumental in previously supporting both the MoA and MoCI gain access to such advice, especially in the rice value-chain, and USIAD FED now intends to continue to support the MoCI as they seek to redefine the GoL's current Rice Importation Policy.

The MoCI was tasked in 2015 to set up a Technical Group to provide recommendations to inform and to prepare a daft for a new Rice Importation and Production Policy for Liberia, which addresses the current constraints to domestic production and will support a significant growth in the sector over the next 10 years. It is intended that in addition to taking on the concerns of stakeholders, this policy document should also provide accurate research based analysis of the sector currently, evaluate the successes / failures of previous reforms and provide an outline of what the sector can look like with new policies.

OBJECTIVE:

The objective of this assignment is to support the MoCI-led Rice Policy- Technical Group to develop the new Rice Importation Policy by facilitating the engagement of a Subject Matter Expert who has significant academic research skills and a deep working knowledge of the rice sector Globally as well as in Liberia and West Africa.

TASKS:

1. Review documents including meeting notes provided by the MoCI-led Rice Policy Committee (to be forwarded by FED)
2. Provide information on recent global trends in rice production and trade, and analysis of potential impact to Liberia in the next two to ten years.
3. Provide updated analyses and 10-year forecast on rice consumption, importation and production in Liberia assuming business as usual vs. with scaling up of FED experience.
4. Provide a comparative analysis of rice policy incentives in ECOWAS countries and their impact on rice production, self-sufficiency rating and GDP.
5. Review the first draft of the Rice Policy Document and provide feedback
6. Provide ad hoc expert advice and inputs to the final draft of the Rice Policy slated to be submitted to the President at the end of September 2015
7. Provide recommendations to USAID, the GoL, other donors, private sector partners and other stakeholders on the next steps after FED to ensure gains achieved under the FED project are optimized towards continuing growth of the rice sub-sector.

DELIVERABLES AND TIMELINES:

Deliverables	Sept 16-21	22-Sep	Sept 23-Oct 5	6-Oct	October 6-7
	Remote LOE - 5	Travel - 1	In Country LOE - 11	Travel-1	Remote LOE-2
1. Document detailing recent global trends in rice production and trade and analysis of potential impact to Liberia in the next two to ten years.	■				
2. Comparative analysis of rice policy incentives in ECOWAS countries and their impact on rice production, self-sufficiency rating and GDP.	■				
3. Draft Rice Policy with comments and inputs	■				
4. Updated analyses and 10-year forecast on rice consumption, importation and production in Liberia assuming business as usual vs. with scaling up of FED experience.			■		
5. Recommendations on key areas for consideration and inclusion in the Rice Policy Document, including policy sequencing in the next 10 years based on deliverables 1, 2 & 4.			■		
6. Powerpoint presentation to stakeholders findings contained in deliverables 1-5 and recommendations to optimize gains achieved under FED in the rice sub-sector.			■		
7. Final Report – A final report that should detail the analysis, recommendations and advice provided to the MoCI, Key Stakeholders and highlight key policy elements that USAID should continue to promote in Liberia.					■

REPORTING: The Rice Policy Expert will report to the Chief of Party or her designee.

REQUIRED QUALIFICATIONS:

- At least 6 years of relevant professional experience, with demonstrated experience in academic research in agricultural sectors;
- Prior experience providing policy recommendations to USAID development projects;
- Excellent academic and in-country understanding of the rice sector in Liberia <u>and</u> the government policies concerning this sector;
- Demonstrated understanding of international best practices for supporting policy formation.
- Excellent verbal and written communications skills; and
- Master's degree, in relevant area of study.

PREFERRED QUALIFICATIONS:

- Prior experience in working with the GoL.
- PHD in relevant area of study.
- Demonstrated understanding of global rice trade and production
- Significant experience in rice sector.

Title: Rice Policy Advisor

Location: Monrovia, Liberia

ANNEX II. 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)[9]. 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 January 2014. 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.

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[9] http://www.uark.edu/ua/ricersch/