S P E C I A L R E P O R T

FAO/WFP CROP AND FOOD SECURITY ASSESSMENT MISSION TO SOUTH SUDAN

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME

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Acronyms and abbreviations

ANLA	Annual Needs and Livelihoods Analysis
BOSS	Bank of South Sudan
CFSAM	Crop and Food Security Assessment Mission
CMD	Cassava mosaic disease
CPA	Comprehensive Peace Agreement
CPI	Consumer Price Index
EU	European Union
FAO	Food and Agriculture Organization
FSMS	Food Security Monitoring System
GDP	Gross Domestic Product
GOSS	Government of South Sudan
ha	hectare (0.42 hectares = 1 feddan)
hh	household
JRC	Joint Research Centre (European Commission)
MAF	Ministry of Agriculture and Forestry
MARF	Ministry of Animal Resources and Fisheries
MCI	Ministry of Industry and Commerce
mm	Millimetres
NBHS	National Baseline Household Survey
NBS	National Bureau of Statistics
NPA	Norwegian People's Aid
OCHA	Office for the Coordination of Humanitarian Affairs
PET	Pictorial Evaluation Tool (crop yield and livestock body condition)
SIFSIA	Food Security Information for Action (EC/FAO)
SSP	South Sudanese Pound
SSRRC	South Sudan Relief and Rehabilitation Commission
t	Tonne
ToT	Terms of trade
USAID	United States Agency for International Development
USD	United States Dollar
WFP	World Food Programme

Mission highlights

- Generally favourable rains and no outbreaks of pests and diseases in 2012, resulted in a net cereal production of about 761 000 tonnes in the traditional sector. At this level, production is about 35 percent above the 2011 estimates and about 6 percent above the average of the previous five years.
- With a projected population of about 10.4 million people in 2013, an overall cereal deficit of nearly 371 000 tonnes is estimated, until the next harvest in late 2013.
- Livestock body conditions are generally good due to adequate pasture and water availability.
- Prices of locally produced cereals have declined in most markets since August/September 2012, but still remain higher than in previous seasons. Higher prices of livestock, especially small ruminants, have improved the terms-of-trade for pastoralists.
- Households are heavily dependent on markets for their staple food supply and exhibit very high levels of expenditure on food, implying that market price patterns need close monitoring as they are a major determinant of household food security
- In 2013, about 4.1 million people are estimated to be facing food insecurity, of which just over 1 million are severely food insecure
- Out of these overall needs, in order to assist the most food insecure rural households, vulnerable children, IDPs, refugees and returnees, an estimated 224 000 tonnes of food will be required in 2013.

1. OVERVIEW

An FAO/WFP Crop and Food Security Assessment Mission (CFSAM) visited South Sudan from 14 October to 16 November 2012 to estimate cereal production and assess the overall food security situation. As well as staff from FAO, WFP and the Ministry of Agriculture and Forestry (MAF), the Mission field teams included representatives from the National Bureau of Statistics (NBS), the South Sudan Relief and Rehabilitation Commission (SSRRC) and participating observers from the United States Agency for International Development (USAID) via FEWSNet and the European Union (EU) observer via the European Commission Joint Research Centre (EC/JRC). In Juba, the Mission held meetings with officials of MAF, the Ministry of Animal Resources and Fisheries (MARF), the Ministry of Commerce and Industry (MCI), the Ministry of Finance and Economic Planning (MFEP), the NBS, the SSRRC, the Bank of South Sudan (BOSS), the Agricultural Bank of South Sudan, the World Bank, the UN Office for the Coordination of Humanitarian Affairs (OCHA) and the International Organization for Migration (IOM) as well as with resident staff of FAO and WFP.

Mission participants were provided with intensive training in CFSAM field techniques over a five-day period at the start of the Mission. At the end of the training, participants were divided into five field teams to visit several counties in all 10 states of South Sudan. Location-specific information was obtained from 288 key informant interviews and farm case studies. Key informants included relevant state and local authorities, including the SSRRC, the State Ministries of Agriculture (SMoA), county and *payam* officials as well as staff of NGOs, the Agricultural Bank in Wau (serving Greater Bahr el Ghazal) and international agencies based in the field. Case studies of farming households were selected on a random (as available) basis. In addition, studies were made of the performance of groups of farmers working together as well as large-scale farming operations of individual farmers, farm companies, market traders and brokers. The information was triangulated with field observations following the Pictorial Evaluation Tool (PET) approach during visits to rural communities and individual farm case studies. Normalized difference vegetation index (NDVI) data and analysis provided by VITO/GMFS for 2012 were compared with local rain-gauge data and accounts of seasonal rainfall this year. The Mission observed market supplies and prices in the main centres, in addition to analysing WFP's market price data.

In accordance with the approach adopted in previous years, the Mission's calculation of cereal production is based on estimates of three variables: (1) estimates of the numbers of farm households in each county; (2) estimates of the average area per farm household under cereals for each county, adjusted according to Mission observations made during field visits; and (3) estimates of average cereal yields for each county. These are then used to provide production figures for each county, state and, ultimately, for the whole country.

Crop growing conditions were generally good in 2012. Following a slow onset in most locations, rainfall levels were normal to above normal and generally well distributed across the country and continued until November. In August and September, localized floods affected crops and settlements in Unity, Upper Nile, Jonglei, Warrap and Lakes States.

Crop pest and disease levels were mostly normal this year. However, insecurity still remains a major constraint to optimising the country's agricultural potential. Incidents of armed cattle rustling, inter and intra-communal conflicts and the activities of militia groups continue to inhibit farmers in affected areas from expanding the cultivated area.

Regarding the traditional sector, the estimated cereal area harvested in 2012 increased by 26 percent as compared to the previous year. About 1.1 million hectares were harvested in 2012 compared to about 860 000 hectares in 2011, and included farming activities by returnees, expansion of farming in response to high grain prices and the inclusion of an estimate of areas of double cropping in the bi-modal rainfall zones. Average cereal yield is estimated at 0.88 tonnes/ha, representing a 7 percent increase as compared to 0.82 tonnes/ha in 2011. Net cereal production, after deduction of post-harvest losses and seed use, is estimated to have increased by about 35 percent, from 563 000 tonnes in 2011 to 761 000 tonnes in 2012.

With a mid-2013 projected population of about 10.4 million people, which includes returnees from late 2009, consuming 109 kg of cereals per capita per year, the cereal requirement in 2013 is estimated at about 1.1 million tonnes. Accordingly, an overall cereal deficit of about 371 000 tonnes is estimated in the 2013 marketing year.

Net cereal production from the mechanized sector is tentatively estimated at about 91 000 tonnes and the bulk of it is expected to be commercialized across the border in Sudan, as in previous years. However, this also represents a supply option for local purchases for food assistance requirements.

Prices of locally produced maize and sorghum have declined in most markets beginning from August/September 2012 due to increased supplies from the newly harvested crops for both local markets and own household consumption. However, cereal prices at the end of 2012 were still well above the levels of one year earlier, especially in flood-affected areas. Livestock prices, especially for small ruminants, have displayed a rising trend during the second half of 2012 which, coupled with declining cereal prices, have substantially improved the terms-of-trade for pastoralists and consequently their purchasing power.

As a result of improved crop production, in late 2012 about 40 percent of the population of South Sudan was moderately to severely food insecure, a decrease from the 47 percent registered in October 2011, but still higher than the levels registered in October 2010. These changes mostly arise from households moving from the moderately food insecure to the food secure bracket. The proportion of severely food insecure households has remained similar in the last 3 years at around a minimum of 10 percent of the total food insecure at harvest time and rising towards mid-2013.

Therefore, the food security outlook for the poorest, most food insecure population engaged in marginal livelihoods will remain very negative with food assistance requirements staying largely unchanged. Out of the wider needs of South Sudan, this sector of the population, plus refugees, returnees and IDPs are the main target of WFP assistance: in the likely scenario, the estimated food assistance requirements stand at 224 000 tonnes to assist 2.86 million beneficiaries, including 490 000 school children (under Food for Education), about 750 000 socially vulnerable populations including under-fives and mothers under blanket and targeted supplementary feeding programme and institutional feeding to the sick. The refugees and IDPs account for about 800 000 people, while the rest of the beneficiaries are the food insecure vulnerable resident household members to be supported through General Food Distribution (GFD) and Food/Cash for Assets (FFA/CFA) activities

A contingency (worst case) scenario has been developed which considers a significant increase in the number of displaced and refugees as a result of a worsening of conflict both internal and across the border with Sudan as well as unfavourable/worsening macro-economic and market conditions. This leads to an additional requirement of 115 000 tonnes, bringing the total requirement to 339 000 tonnes for an extra 1.17 million beneficiaries (amounting to a total of about 4 million beneficiaries).

2. SOCIO-ECONOMIC CONTEXT

2.1 General

Following the referendum held at the beginning of 2011, South Sudan became an independent nation on July 9, marking the conclusion of the Comprehensive Peace Agreement (CPA) that had been in place since 2005. Despite significant improvements since the inception of the CPA and continuing efforts to unify and stabilise the country, insecurity is still widespread in the northern border regions with Sudan and in areas affected by inter and intra-communal conflict. In particular, the conflict with Sudan revamped at the end of March 2012 over oil-rich regions between the South Sudan's Unity State and the Sudan's South Kordofan State and lasted for about three weeks, causing the displacement of about 100 000 individuals.

The 2008 Population and Housing Census of South Sudan estimated population at 8.26 million, with more than 50 percent below the age of 20. Given the implicit annual increment of 3 percent, as suggested by the National Bureau of Statistics (NBS), and including about 864 000 people that returned to South Sudan between October 2010 and October 2012, the population for mid-2013 is estimated at about 10.4 million. While the population has increased, population density still remains one of the lowest in sub-tropical countries, with on average only 16.2 inhabitants per square km.

2.2 Economy

2.2.1 Economic growth and national budget

The country's 2011 gross domestic product (GDP) was estimated at about SSP 54 million, about 57 percent higher than previous year, essentially due to high oil prices and the end of oil revenue sharing with Sudan. South Sudan's economy is heavily dependent on oil revenue, which traditionally accounts for 98 percent of government revenue (excluding foreign aid) and 70 percent of GDP. The decision to suspend oil production in January 2012, following tensions with the Sudan on oil production and pipeline transit fees, caused large deficits in the budget and in the balance of payments, with a significant contraction of real GDP expected in 2012. The wider impact of oil shutdown on local economy has been cushioned by financing both imports and public expenditure by drawing on foreign reserves. Other sources of financing are non-oil revenues, sale of petroleum and mining concessions, borrowing from commercial banks and access to foreign loans. In particular, regarding foreign loans, the IMF announced in September that South Sudan is eligible for concessional lending.

Overall, total government expenditure for 2012/13 is estimated at about SSP 10.6 billion, including SSP 6.7 billion by the approved RoSS budget and about SSP 3.9 billion by donor organizations' funding. Available resources to finance the 2012/13 RoSS budget were about 30 percent below the 2011/12 outturns as a consequence of lack of oil revenues. Initial austerity measures were approved by the Council of Ministers on March 2012 by modifying the 2011/12 budget (July/June) and immediately reducing government spending from planned SSP 850 million per month to SSP 650 million per month. Then, further cuts on expenditure were proposed in the 2012/13 budget presented in June 2012, with reduction of salaries (essentially housing allowances and overtime) by 22 percent, operating expenditures (workshops, conferences and travels) by 37 percent, capital (such as civil works and construction, unless funded by grants/loans) by 76 percent and transfers to states by 5 percent.

Table 1: South Sudan - 2012/13 expenditure by funding sources and by sectors (million SSP)

Sector	RoSS budget	Donors' funds	Total	Percent
Accountability	161.6	133.3	294.9	2.8
Economic functions	261.9	147.5	409.4	3.9
Education	454.1	313.6	767.7	7.2
Health	192.1	578.9	770.9	7.3
Infrastructure	160.2	824.6	984.8	9.3
Natural resources	343.0	487.4	830.4	7.8
Public administration	525.7	313.0	838.7	7.9
Rule of law	1 109.8	217.0	1 326.8	12.5
Security	2 730.4	219.5	2 949.9	27.8
Social & humanitarian	75.2	698.6	773.8	7.3
Block transfers to States	650.1		650.1	6.1
Total	**6 664.2**	**3 933.3**	**10 597.5**	**100.0**

A significant relief on local economy is expected from the implementation of the September cooperation agreement between Sudan and South Sudan. Both countries committed to implement a series of arrangements dealing with security, border demarcation, management of oil resources and export, cross-border trade, movements of people and cooperation on central banking issues. Regarding the oil sector, South Sudanese oil production and exports are expected to resume in early 2013, at least from oilfields in northern Upper Nile state that are expected to quickly reach an output of 180 000 barrels/day, about 70 percent of the level prior of the shutdown in January 2012. Conversely, oil production from the wells in Unity state, which were yielding additional 100 000 barrels/day but have been severely damaged during the conflict, is not expected to resume until mid-2013.

2.2.2 Exchange rate and inflation

The South Sudanese Pound (SSP) was introduced following independence and operates under a managed float; the lower and upper band limits were set at SSP 2.9 and 3.3 per USD, while the SSP was initially established at parity with the Sudanese pound (SDG). After a period of relatively rapid depreciation attributed to the country's tight foreign reserves, the Bank of South Sudan (BSS) decided to increase foreign currency supplies in main urban markets by late 2011 and the SSP regained its value. The exchange rate has remained quite stable until February 2012, when allocation of foreign currency started to decline again following the shutdown of oil production, weakening the SSP's value on the black market up to SSP 5.4 per USD at beginning of August. Since mid September 2012, the black market exchange rate appreciated by about 16 percent, reaching SSP 4.3-4.5 per USD, as the BSS signed a loan agreement of USD 100 million with the Qatar National Bank to help imports of basic commodities, like food, fuel, building materials and medicine, allowing importers to buy USD at favourable bank exchange rate of SSP 3.2.

According to the NBS, year-on-year inflation peaked at 79.5 percent in May 2012, mainly due to high food prices and exchange-rate weakness following the oil shutdown. Subsequently, it gradually slowed down until October and, after a spike in November, prices returned to the levels of the third quarter of 2012 in December 2012. Higher levels of annual inflation are reported in most northern border areas, such as Malakal, where traditional trade routes from Sudan have been seriously disrupted and the local supply of basic commodities is often scarce. On a monthly basis, the consumer price index declined by 10.6 percent between November and December 2012, driven by a reduction in prices of food commodities, especially fruits and vegetables.

2.3 Agriculture

South Sudan experiences both unimodal and bimodal rainfall regimes. The bimodal areas cover much of Greater Equatoria (Western, Central and Eastern Equatoria) while the rest of the country has a unimodal regime. This results in a range of growing seasons from 280 to 300 days in the south-western parts of South Sudan (known as the Greenbelt) to 130-150 days per annum in the northern states. Agricultural performance consequently varies considerably depending primarily on latitude, with the possibility of two and even three harvests per annum from the same plots in the Greenbelt in Greater Equatoria, and a single harvest in the unimodal areas further north.

With almost all agricultural production being rainfed, rainfall variability is a major factor in determining crop performance. Usually rainfall increases in a north-easterly to south-westerly *direction* culminating in the Greenbelt along the border with the Central African Republic, the Democratic Republic of Congo and Uganda; but there is usually considerable variation in rainfall from year-to-year and from location-to-location within the same year. In lowland areas, flooding is a common occurrence, while many areas, especially those towards the north and south-east of the country, are susceptible to prolonged dry periods.

Crop production is mostly conducted on small, hand-cultivated plots farmed by women-headed households belonging to larger family aggregations, reflecting the polygamous nature of most communities. Notwithstanding an abundant availability of land, the area cultivated by households is limited by the size of the household labour force and/or the ability of the household to provide in kind payment (essentially food/beer) for the mobilisation of traditional working groups (*nafeer).* After several years of conflict and high levels of insecurity, farmers have been induced to cultivate only land close to their home.

Cereal area per household is estimated this year at 0.90 ha and, in a first attempt to disaggregate cereal areas made on the basis of information collected by the Mission teams, it is suggested that sorghum, the main crop cultivated by the traditional sector in South Sudan comprises about 69 percent of the area sown. Maize is estimated to be planted in 27 percent of the area (including estimates of double cropping) and other cereals including bulrush and finger millet and rice make up the remaining 4 percent. Regarding sorghum, there are a large number of local landraces and varieties ranging with lengths to maturity fitting agro-ecological niches[1] ranging from short-season to very long-season (more than 220 days) and from short stature to the very tall (more than 3 metres) in use throughout the country. It is the main staple food in all states except for the three Equatorias where the local diet also includes maize flour and cassava. Other crops increasing in popularity in Central and Western Equatoria include sweet potato, and yams.

In Northern and Western Bahr el Ghazal, Warrap and Lakes, sorghum is often intercropped with sesame and some small amounts of bulrush millet. Maize is normally cultivated in limited areas close to homesteads and is consumed green with the first early sorghums in August-September. In Upper Nile, where the threat from grain eating birds is significant, maize is cultivated instead of sorghum in order to avoid grain loss. Groundnut is cultivated on sandy soils in most locations and makes an important contribution to household diet throughout the northern states; it is also the main cash crop in the northern states.

Okra, cowpea, green-gram, pumpkin, bambara nut and tobacco are also widely grown around homesteads in all areas. Vegetables such as onions or tomatoes are not commonly grown in rural areas, but are increasingly cultivated near cities to supply urban markets.

Farmers commonly use their own seed saved from the previous year's harvest, and virtually no commercial fertilizers, pesticides or herbicides are used.

Rain-fed mechanized cereal production is practised mainly in the Upper Nile counties of Renk, Melut and Malakal. Elsewhere, limited numbers of both private and GOSS tractors provide ploughing services to individuals and farmer-groups at prices ranging from SSP 50 (GOSS subsidised) to SSP 350 per feddan for a single pass. Mechanization applies only to land preparation, while all other operations from sowing to harvesting are done manually. Major problems related to supply of fuel and spare parts, operator skills and maintenance and repair capabilities persist, severely limiting the efficiency of the tractor service. Pilot programmes to introduce and support the use of two-wheeled walking tractors offers a financially sustainable, alternative to the distribution of large 4-wheeled units that are prematurely scrapped due to inadequate maintenance. Before South Sudan independence, aerial spraying of nesting sites routinely controlled Quelea birds near the mechanized areas. This practice is no longer followed leaving a threat of migratory pest infestation in January each year.

During the past 20 years, animal traction has been promoted by the MAF, FAO and some NGOs in Central Equatoria, Eastern Equatoria, Lakes, Warrap and Bahr el Ghazal States in attempts to facilitate

[1] Short season landraces provide an early harvest in August/September; long season landraces withstand dry spells and water logging and are harvested in December/January.

an increase in the area cultivated by each household. At last, previously noted constraints to its adoption appear to be lifting, with requests for increased access to purchase units reported in Lakes and Central Equatoria. However, lack of spare parts, skills to maintain mould-board ploughs, raw materials for local blacksmiths and low levels of operator skill still limit expansion; as does a lack of resources to capitalise on the increased area through improved weeding[2].

Livestock are very important assets throughout the country, the main species being cattle, goats and sheep. The sale of livestock, especially small ruminants, offers significant income generation opportunities for both transhumant pastoralists and sedentary livestock rearers.

3. CEREAL PRODUCTION IN 2012

In the absence of any nationally generated, crop-yield forecasts and accurate data of cropped land disaggregated by crop, cereal production is assessed using estimates of the following three variables: (1) estimates of the numbers of farm households in each county, based on total county population figures and the proportion of rural to urban dwellers; (2) standard estimates of the average area per farm household under cereals for each county, adjusted according to Mission observations made during field visits; and (3) estimates of average cereal yield for each county, based on Mission observations and calculations, interviews with farmers and rural communities, and information obtained from SMoA, NGOs and others involved in agriculture. The product of these three factors gives a cereal production figure for each county. These county figures are then used to provide cereal production figures for each of the ten states and for South Sudan as a whole. The number of assumptions incorporated into this methodology means that the final production figures should not be regarded as necessarily exact, but rather as best estimates under the prevailing circumstances. The Mission stresses the need for a rigorous agricultural survey in order to establish a more accurate baseline with regard to cropped areas.

3.1 Cereal harvested area estimates

The Mission's harvested cereal area estimates for the smallholder sub-sector in 2012 are calculated on the basis of the numbers of farming households in each county according to the 2008 census data, which includes numbers of households (both rural and urban) per county. Census figures have been adjusted for mid-2013 on the assumption of a population growth rate of 3 percent per annum. Numbers of returnees per county have been updated from late 2009 based on information provided by the International Organization of Migration (IOM). The numbers of farming households have been further adjusted considering the households displaced by floods and conflict during 2012 as reported by OCHA.

The figures used for the proportion of farming households in each county have been developed over several years by FAO, WFP and others, based on extensive observations and interviews. Average harvested area under cereals per farming household in each county has been adjusted upwards this year on the basis of information gathered through field observations, measurements and interviews. This increase in area is mainly due to:

- opportunistic planting because of encouraging rainfall patterns;
- increased use of animal traction;
- support to farming groups and general government promotion of domestic production and self-reliance in the face of diminished oil revenues;
- returnees farming.

In addition, conservative upward adjustments to the area have been made as a step towards recognising, quantitatively, the important contribution made by second cropping in the bi-modal rainfall areas.

The Mission estimates the total area of cereal harvested in the traditional sector in 2012 at 1.084[3] million hectares, about 26 percent above last year's figure. Table 2 presents the breakdown of area cultivated by state and county.

[2] In this regard, the local transfer of donkey plough (*scuffler*) technology from Darfur to West Bahr el Ghazal offers an immediate solution for inter-row cultivation including weeding and thinning of broadcast crops.
[3] Including a conservative estimate of areas with double-cropping of maize in the Greenbelt.

Table 2: South Sudan - Estimated settled population, farming households and harvested cereal area in 2012

State/County	Population mid-2012	Households mid-2012	Farming households (percent)	Farming households mid-2012	Average cereal area (ha/hh)	Total cereal area (ha)
Central Equatoria	**1 355 248**	**220 483**	**65**	**142 817**	**1.04**	**147 859**
Returnees to 2012	130 693	21 784	50	10 892	0.48	5 228
Juba	413 232	64 844	50	32 422	1.00	32 422
Kajo Keji	217 952	36 121	90	32 508	1.10	35 759
Lainya	99 105	15 517	60	9 310	1.10	10 241
Morobo	114 959	17 431	60	10 458	1.20	12 550
Terekeka	155 784	27 845	90	25 061	1.00	25 061
Yei	223 523	36 942	60	22 165	1.20	26 598
Eastern Equatoria	**1 028 992**	**174 639**	**74**	**129 195**	**1.01**	**130 447**
Returnees to 2012	23547	3 925	77	3 022	0.50	1 511
Budi	110 073	18 611	90	16 750	0.85	14 238
Ikotos	93 927	18 332	90	16 499	1.10	18 149
Kapoeta East	181 972	32 668	50	16 334	1.00	16 334
Kapoeta North	114 383	17 724	50	8 862	1.00	8 862
Kapoeta South	88 180	13 148	50	6 574	1.00	6 574
Lafon	117 798	19 083	85	16 220	0.90	14 598
Magwi	188 440	29 154	90	26 238	1.20	31 486
Torit	110 672	21 995	85	18 695	1.00	18 695
Jonglei	**1 610 747**	**230 721**	**68**	**157 582**	**0.68**	**107 623**
Returnees to 2012	103 230	17 206	78	13 421	0.50	6 710
Akobo	151 140	19 654	76	14 937	0.70	10 456
Ayod	154 548	18 737	70	13 116	0.70	9 181
Bor South	245 341	34 791	64	22 266	0.70	15 586
Duk	72 777	11 364	63	7 160	0.70	5 012
Fangak	122 201	16 169	90	14 552	0.70	10 187
Khorflus/Pigi/Canal	109 927	13 274	90	11 947	0.70	8 363
Nyirol	120 586	16 944	76	12 877	0.70	9 014
Pibor	164 750	25 234	24	6 056	0.70	4 239
Pochalla	73 457	11 590	71	8 229	0.70	5 760
Twic East	94 704	15 952	65	10 369	0.70	7 258
Uror	198 087	29 806	76	22 653	0.70	15 857
Lakes	**853 409**	**116 012**	**83**	**96 581**	**0.94**	**90 880**
Returnees to 2012	81 421	13 570	82	11 128	0.45	5 007
Awerial	52 197	8 300	45	3 735	0.63	2 353
Cueibet	130 662	19 178	94	18 027	1.00	18 027
Rumbek Centre	170 381	18 660	80	14 928	0.90	13 435
Rumbek East	136 296	17 214	80	13 771	1.10	15 148

State/County	Population mid-2012	Households mid-2012	Farming households (percent)	Farming households mid-2012	Average cereal area (ha/hh)	Total cereal area (ha)
Rumbek North	48 168	5 496	80	4 396	1.10	4 836
Wulu	44 995	7 231	95	6 869	1.00	6 869
Yirol East	74 790	9 955	90	8 960	1.00	8 960
Yirol West	114 500	16 407	90	14 766	1.10	16 243
N Bahr el Ghazal	**942 954**	**172 042**	**83**	**143 553**	**0.75**	**107 274**
Returnees to 2012	143 039	23 840	58	13 827	0.40	5 531
Aweil Centre	46 412	10 076	24	2 418	0.50	1 209
Aweil East	343 891	63 111	94	59 324	0.80	47 459
Aweil North	143 281	27 620	95	26 239	0.75	19 680
Aweil South	81 896	15 592	76	11 850	0.80	9 480
Aweil West	184 436	31 803	94	29 894	0.80	23 916
Unity	**847 315**	**111 737**	**72**	**80 823**	**0.52**	**42 092**
Returnees to 2012	197 305	32 882	65	21 374	0.45	9 618
Abiemnhom	18 876	2 004	80	1 603	0.50	802
Guit	36 622	3 586	80	2 869	0.60	1 721
Koch	83 069	8 827	90	7 944	0.45	3 575
Leer	58 833	7 816	72	5 627	0.50	2 814
Mayendit	59 678	7 332	86	6 305	0.50	3 153
Mayom	133 946	16 884	80	13 507	0.63	8 510
Panyijar	56 282	9 626	90	8 664	0.45	3 899
Pariang	91 480	11 607	70	8 125	0.63	5 119
Rubkona	111 222	11 172	43	4 804	0.60	2 882
Upper Nile	**1 126 659**	**167 483**	**66**	**110 257**	**0.73**	**80 083**
Returnees to 2012	56 602	9 432	60	5 659	0.45	2 547
Baliet	53 273	8 053	79	6 362	0.60	3 817
Fashoda	40 520	6 544	90	5 889	0.80	4 711
Longochuk	70 090	9 185	80	7 348	0.50	3 674
Luakpiny/Nasir	233 020	32 212	76	24 481	0.63	15 423
Maban	50 197	10 906	80	8 725	0.50	4 362
Maiwut	88 172	11 625	80	9 300	0.50	4 650
Malakal	140 347	18 744	50	9 372	0.45	4 217
Manyo	42 176	7 089	90	6 380	0.70	4 466
Melut	54 640	7 887	38	2 997	1.70	5 095
Panyikang	50 407	8 065	50	4 032	0.50	2 016
Renk	152 850	24 957	38	9 483	2.00	18 967
Ulang	94 366	12 784	80	10 227	0.60	6 136
W Bahr el Ghazal	**433 129**	**75 649**	**78**	**58 702**	**0.96**	**56 635**
Returnees to 2012	62 835	10 471	68	7 120	0.50	3 560
Jur River	141 897	23 066	60	13 840	1.20	16 608

State/County	Population mid-2012	Households mid-2012	Farming households (percent)	Farming households mid-2012	Average cereal area (ha/hh)	Total cereal area (ha)
Raga	60 348	11 326	75	8 495	0.85	7 221
Wau	168 049	30 786	95	29 247	1.00	29 247
Warrap	**1 158 607**	**201 267**	**87**	**175 114**	**0.93**	**163 603**
Returnees to 2012	78 117	13 020	83	10 807	0.30	3 242
Abyei	58 729	8 769	75	6 577	0.40	2 631
Gogrial East	114 702	20 566	79	16 247	1.00	16 247
Gogrial West	270 888	49 961	78	38 970	1.00	38 970
Tonj East	128 959	21 935	95	20 838	1.00	20 838
Tonj North	183 488	32 971	92	30 333	1.00	30 333
Tonj South	96 165	16 148	95	15 341	1.00	15 341
Twic	227 558	37 897	95	36 002	1.00	36 002
Western Equatoria	**709 804**	**132 919**	**87**	**115 377**	**1.37**	**157 557**
Returnees to 2012	22 338	3 722	50	1 861	0.6	1 070
Ezo	89 801	20 213	90	18 192	1.4	25 105
Ibba	46 498	11 636	89	10 356	1.4	14 291
Maridi	91 578	14 568	90	13 112	1.3	17 340
Mundri East	53 659	7 575	73	5 530	1.4	7 631
Mundri West	37 731	4 472	80	3 577	1.4	4 937
Mvolo	53 456	7 284	80	5 827	1.4	8 042
Nagero	11 191	2 381	90	2 143	1.4	2 957
Nzara	72 977	18 123	89	16 130	1.4	22 582
Tambura	61 486	14 788	90	13 309	1.4	18 633
Yambio	169 090	28 156	90	25 341	1.4	34 970
SOUTH SUDAN	**10 066 865**	**1 602 951**	**75**	**1 210 001**	**0.90**	**1 084 053**

Cultivated area increased generally in all states, from 10 percent in Unity to 60 percent in Northern Bahr el Ghazal. Only in Jonglei, area harvested remained similar to previous year's already low estimate as more than 315 000 people were reported by OCHA to have been displaced either by floods or by conflict, with likely negative impact on planted area.

Although mixed cereals still form the basis of the quantitative estimates of production in the cereal balance, disaggregated areas of sorghum, maize and other cereals (upland rice, paddy rice, finger millet and bulrush millet) have been tentatively estimated for the first time using information from Mission teams and are presented by State in Table 3 along with estimates of groundnut and cassava areas.[4]

[4]Cassava varieties harvested within one year of planting are available on many of the cassava growing farms; but no details were captured by the Mission teams. The main system noted is the two-year system involving planting from May to August and harvesting between 18-24 months afterwards.

Table 3: South Sudan - Tentative estimates of cropped areas (ha) per household in 2012

States	Sorghum	Maize	Other cereals 1/	Total cereals	Ground-nuts	Cassava 2 years	Cultivated area
Central Equatoria	0.67	0.35	0.02	1.04	0.26	0.11	1.41
Eastern Equatoria	0.64	0.26	0.11	1.01	0.17	0.11	1.29
Western Equatoria	0.43	0.90	0.04	1.37	0.30	0.30	1.97
Jonglei	0.44	0.24	0	0.68	0.10	0	0.78
Upper Nile	0.49	0.23	0	0.72	0	0	0.72
Unity	0.36	0.16	0	0.52	0.05	0	0.57
Lakes	0.84	0.10	0	0.94	0.19	0.06	1.19
Warrap	0.83	0.05	0.05	0.93	0.19	0	1.12
Western Bahr el Ghazal	0.88	0.10	0.03	1.01	0.19	0.09	1.29
Northern Bahr el Ghazal	0.71	0.05	0	0.76	0.15	0	0.91
Country's average	0.63	0.24	0.03	0.90	0.16	0.06	1.12
South Sudan (hectares)	760 000	286 000	38 000	1 084 000	190 000	78 000	1 352 000

1/ Bulrush and finger millets, upland rice and paddy rice.

3.2 Factors affecting yields

3.2.1 Rainfall

The remote sensing vegetation indices (NDVIs), rain gauge data and farmers' opinions provided a picture of a slow-starting main season that developed into a better than average year in which both the quantity and the distribution of rain were adequate for crop and pasture growth. However, abundant rains in areas prone to flooding and water-logging caused homes and fields to be abandoned in 46 out of 79 counties in all states but particularly, according to OCHA, in Jonglei, Warrap, Unity, Northern Bahr el Ghazal, Western Bahr el Ghazal, Lakes and Upper Nile States. A total of 45 113 households (of which 33 000 are reported to be in Jonglei state) have been affected, out of the 1.15 million households estimated to be farming this year.

The series of Figures 1 to 3 below provide NDVI graphic representations of vegetation development over the year in the arable areas of each state clustered into the three Regions of Greater Equatoria, Greater Bahr el Ghazal and Greater Upper Nile. Remote sensing derived NDVI images show that the vast majority of farming households have benefitted throughout the season from significant rains, which have continued well into November. Compared with last year, the rainfall pattern was more regular, with fewer and shorter dry spells. Figure 1 shows that after the second dekad in April, before which vegetative growth was slower, apparently due to the lingering effects of previous year rainfall deficits[5], all three states in Greater Equatoria exhibit average or greater than average vegetation development for the remainder of the season. Rain was continuing to fall in the region until the end of the Mission in mid November.

[5] WFP, Rome; Agro-Met Specialist (2012).

Figure 1: South Sudan - NDVI Summaries – Central, Eastern and Western Equatoria

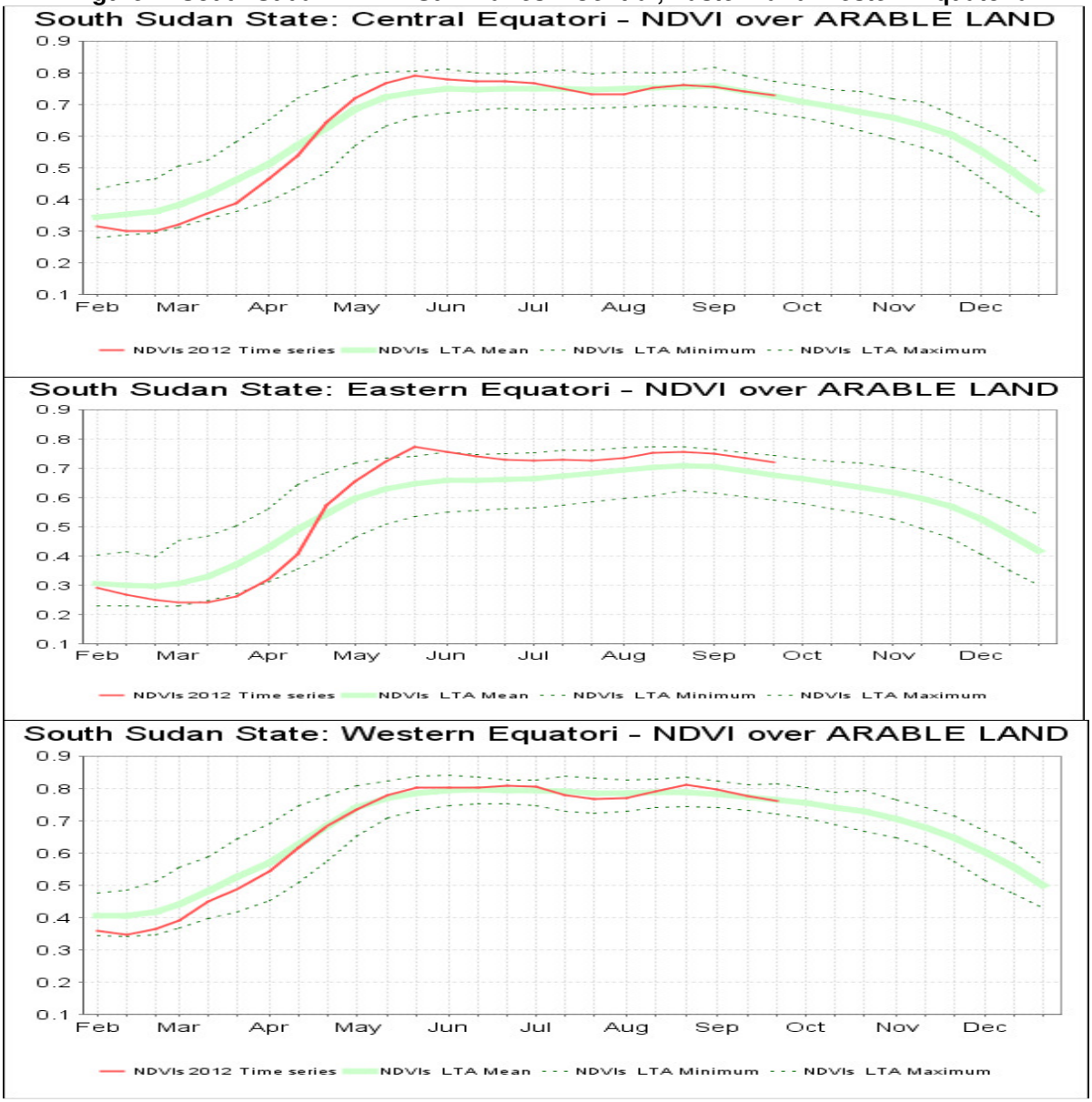


Figure 2 shows that except for poor development of vegetation in May-June in Northern Bahr el Ghazal, and, to a lesser extent in Western Bahr el Ghazal. The graphs of the other two states suggest a timely start to the main season, followed by average or better than average growth throughout the season. The farmer and key informant assessments of the rainfall, and the dekadal data for Northern Bahr el Ghazal presented in Annex 1 suggest that the rains began in earnest in May, had a short break in mid-July and were comparatively heavy until the first dekad of October.

Figure 2: South Sudan - NDVI Summaries – North, and West Bahr el Ghazal, Warrap and Lakes

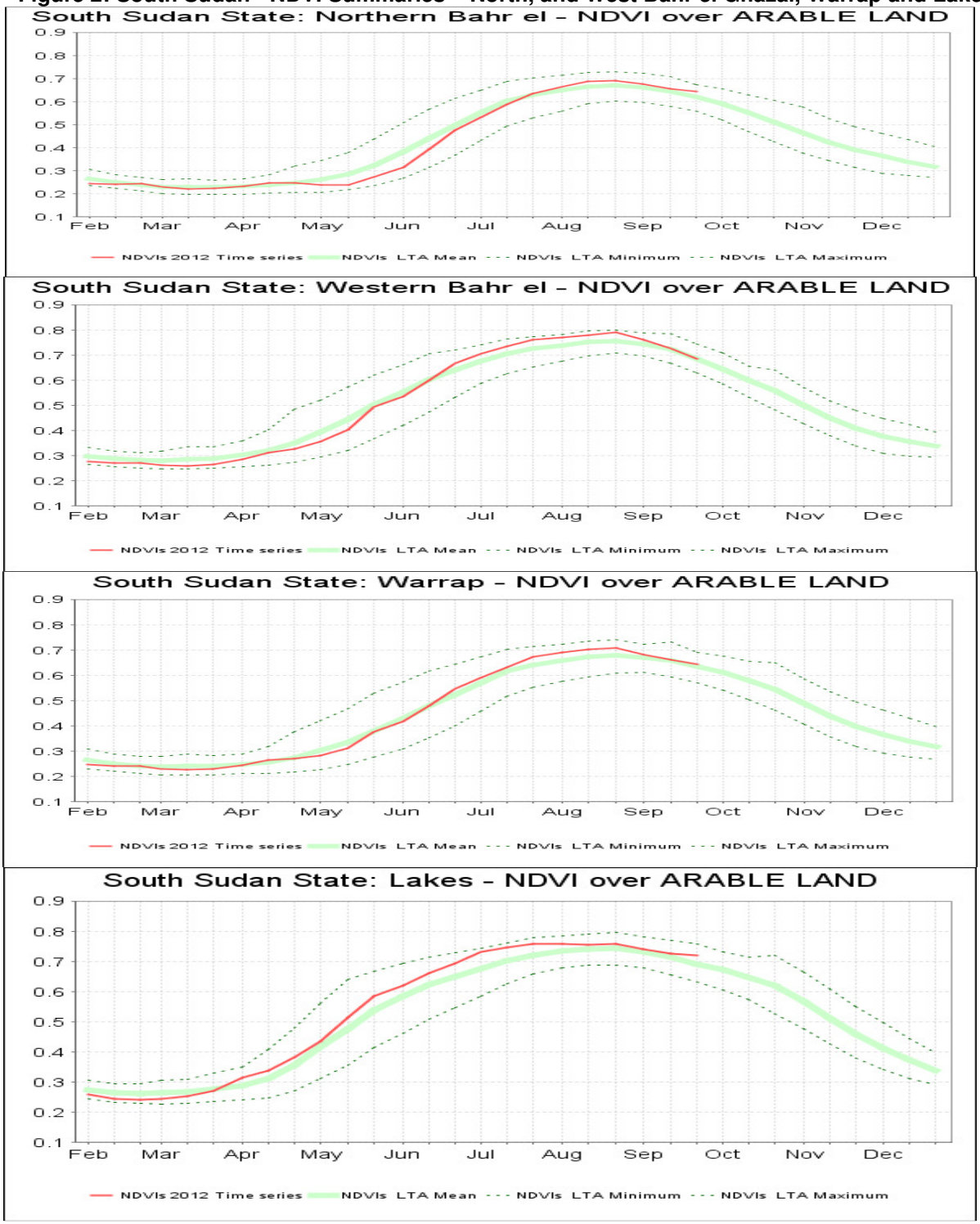
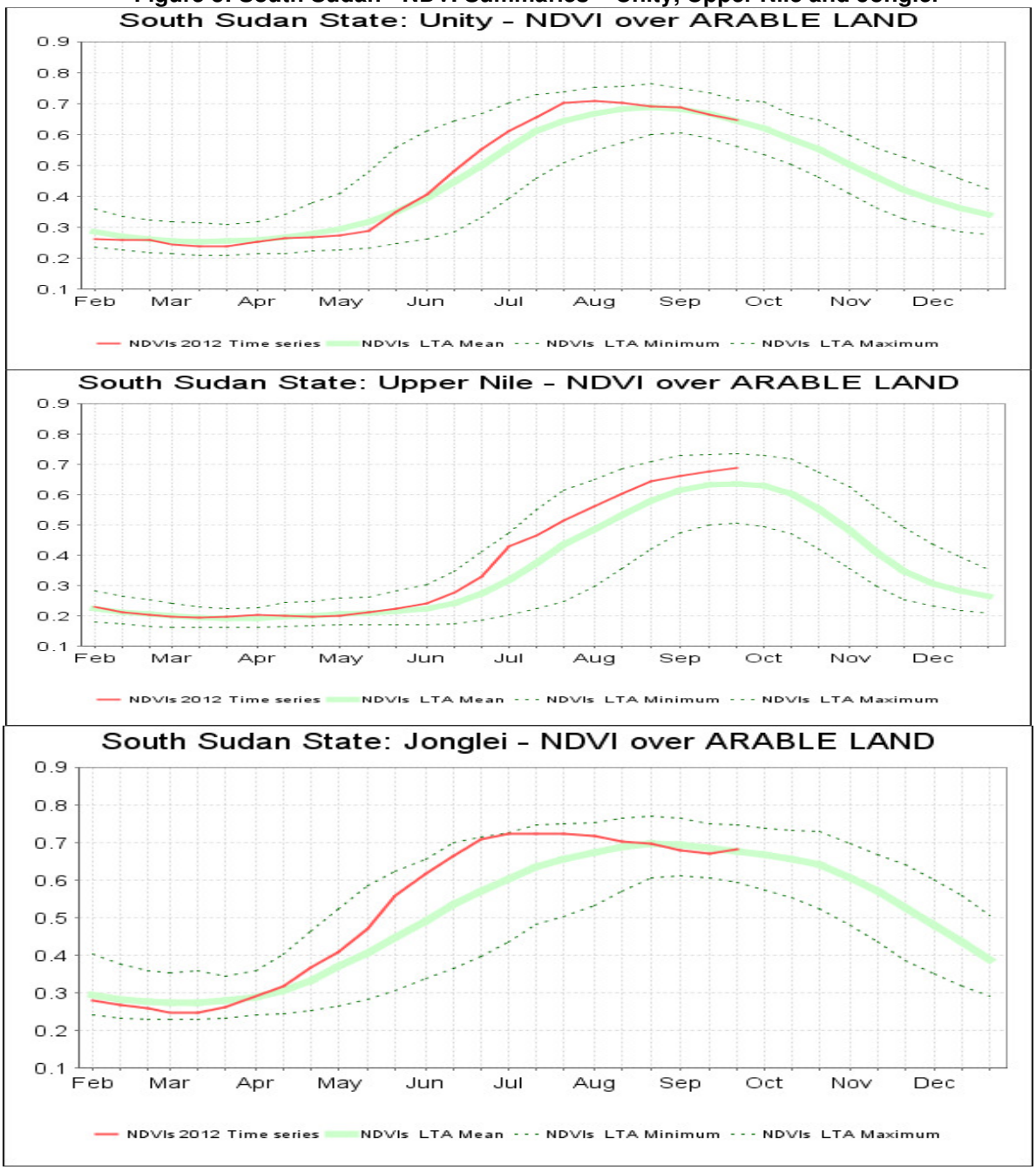


Figure 3 shows NDVI development curves for the three north-eastern states that exhibit a similar pattern of timely, early growth, followed by better than average vegetation development throughout the season.

Figure 3: South Sudan - NDVI Summaries – Unity, Upper Nile and Jonglei



Overall, Figures 1, 2 and 3 reinforce the information collected and transect observations made during the field visits that took place in November. At that time, the late-maturing and second-season crops were growing very well in almost all areas and the early maturing crops were noted to be “ratooning” even in Aweil Centre. What is not reflected in the graphs, but was confirmed by Mission observations, are the effects of flooding and water-logging that may have had negative effects on the performance of early-maturing crops which in many cases have already been harvested and consumed, before the Mission arrived.

The general effects of this year’s rain may be summarised as follows:

- A slow start except in Upper Nile, but checks in May-June slowed performance of the early-planted maize and short-cycle sorghums in Greater Bahr el Ghazal.

- No widespread replanting but *gap filling* by sowing and by transplanting needed to overcome patchiness in germination from dry-spell affected, seedlings of middle-cycle sorghums in June in all areas except West and Central Equatoria.
- Average or better growth and development from late June onwards and an improved crop performance to date over last year in all localities, except for the two noted above.
- Flood damage to some 45 000 households has been recorded by OCHA; their estimated farm areas have been deducted from the county totals.
- Extended planting of long-cycle sorghums and late planting of short–cycle sorghum and maize crops for December/January harvesting in all areas where such systems are traditionally practised was noted. The crops are expected to do well due to late rains. By the same token much more ratooning of early maturing sorghums that were harvested in September is noted this year; with more plants likely to yield an opportunistic grain bonus this year.
- An improved performance to date over last year was noted in all localities, except in Jonglei where displacement by flood and insecurity had a negative impact on agricultural activities.

Similarly, early and well-distributed rains in Renk encouraged and supported widespread early planting in the mechanized sector and short breaks in August and September might have facilitated access to the vertisols. The improved vegetative growth across Upper Nile in Figure 3, suggests that provided an adequate access to machinery, most crops should do well.

3.2.2 Inputs in the traditional smallholder sector

The traditional sector depends on local inputs, such as manual labour and local planting material (seeds and cuttings). Declining soil fertility is addressed by shifting and fallowing within a recognisable farm area and, in some states, by the use of homestead animal dung and contracted-dunging by pastoralists' herds and flocks on private farmland. Plant protection is limited to bird-scaring and guarding fields at critical times of the day or night, and weeding of broadleaf and grass weeds, often several times in the same spot during the season.

Traditional tools and equipment are a significant limiting factor for agricultural activities. For the majority of households, farm size is limited to the area of land the farming families can clear, cultivate and weed with the ubiquitous flat-bladed long-handled hoe, called *maloda,* or the local short–handled, bent hoe, called *turiya,* or the East African hoe or *jembe.* Consequently, the average cereal area is estimated at 0.90 ha, while greater areas could be cultivated in the following cases:

a) Through self-help groups of farm families working in day-by-day cycles to clear, cultivate and weed each other's farms at no cost to one another;
b) through hiring labour, whereby the wealthier farmers extend areas by using food and beer-funded labour groups (*nafeer)*;
c) through hiring labour gangs at rates according to workload – thus in West, East and Central Equatoria labour rates ranged from +SSP 300/feddan for clearing, digging from SSP 300-600/feddan (double digging being more expensive than the combined tractor ploughing/harrowing operation). In Greater Bahr el Ghazal labour rates quoted at SSP 10-12/day would suggest a similar charge per feddan;
d) through contracted bullock ploughing which is noted to have increased in Greater Equatoria and Bahr el Ghazal with rates from SSP 100 to SSP 350/feddan, cheapest in Lakes due to increased access to the technology, which is being enhanced by asset sharing between farm families. Problems associated with the rolling-out of this technology have been mentioned many times in previous Missions;
e) through tractor hiring by better off individuals, groups and emerging enterprises. Similar prices to hire tractors are noted in all states ranging from one pass at SSP 50/feddan (GOSS subsidised) to SSP 200-300/feddan using private contractors, plus the price of fuel. Fuel prices noted by teams vary from SSP 140 to 240 per jerry-can, with the higher prices recorded in North and West Bahr el Ghazal, Unity and Upper Nile States, after the closure of the border with Sudan.

Regarding common hand tool availability, there is no indication from Mission Team returns that a lack of hand-tools is affecting performance. On the contrary, cultivated areas are noted to be expanding. However, concern was noted regarding the absence of raw materials for local blacksmiths since the closure of the border with Sudan, which is presently causing price increases in the locally made items. In keeping with the current programmes, there have been continuing distributions of tools to returnees and

returnee-affected and *needy* families and to adherents of particular programmes in some but not in all states. FAO and partners provided tools to 67 650 households for the 2012 agricultural season, 141 662 pieces of assorted hand tools were distributed to the beneficiaries, mainly returnees, IDPs and vulnerable host communities through direct distribution according to the data given in Table 4.

Table 4: South Sudan - Summary of hand tools distributed (units)

States	Tools provided to beneficiaries			Total
	Maloda	Sickles	Panga	
Warrap	8 000	4 000		12 000
Lakes	12 000	6 000		18 000
Jonglei	28 000	7 240	7 422	42 662
Unity State	26 000	13 000		39 000
Abyei/Agok	28 000		2 000	30 000
Total	**102 000**	**30 240**	**9 422**	**141 662**

Regarding seed supply, Mission teams over the past 15 years have always reported a firm reliance of all settled farmers on local landraces, either farm produced and carried over from one year to the next, supplied by kinship connections or purchased in local markets. This year is no exception. However, in addition to the general pattern of supply, the Mission notes other sources of supply of seeds. After the experience gained under the Operation Lifeline Sudan consortium, most NGOs have been providing planting material to IDPs, returnees and vulnerable households by buying and redistributing local landraces rather than importing exotic varieties that are often not used or perform less well than indigenous material[6]. With FAO support, a total of 891 tonnes of assorted staple crop seeds, 62.7 percent locally sourced and 37.3 percent internationally sourced, have been distributed as described in Table 5.

Table 5: South Sudan - Summary of staple crop seeds distributed through FAO programme

State	Target (hhs)	Seeds provided to farmers (tonnes)						
		Sorghum	Maize	Ground-nuts	Cowpeas	Beans	Sesame	Total
N. Bahr el Ghazal	10 000	40	20	70	20	0	20	170
Warrap	4 000	0	32		8	0	0	40
Lakes	7 000	8.7	0	45	16	0.1	0.1	69
Jonglei	16 000	72	72	80	20	0	0	244
Unity State	13 000	65	65	0	26	0	0	156
Abyei/Agok	14 000	70	70	0	28	0	0	168
Central Equatoria	800	1	2	5.25	0.04	1.8	0	10
W. Equatoria	1 000	2.9	1.6	6.8	0	0	0.21	11.5
E. Equatoria	850	1.7	1.6	2.1	0.3	1.6	3.2	10.5
W. Bahr el Ghazal	1 000	0.4	0.3	10.8	0	0	0	11.5
Grand total	**67 650**	**261**	**265**	**220**	**118**	**3.5**	**23.5**	**891**

The total of 891 tonnes (561 tonnes local) distributed to 67 650 household compares with FAO purchased, imported and distributed seeds in 2011 comprising 1 145 tonnes of assorted seeds from Uganda distributed through 36 NGOs to 101 000 households. National seed use is estimated to be in the order of 25 000 tonnes of assorted local cereal seeds sown by the 1.2 million households estimated to be farming.

[6]Most local landraces have an un-recognized potential that should now be realized by participatory selection, comparison and breeding programs rather than being replaced by conveniently purchasable but less useful “improved” varieties.

Regarding other inputs, the use of fertilizers remains at a limited level connecting to pilot schemes and demonstration plots. Use noted this year includes:

a) Urea top dressing at 50 kg/feddan used on 2 000 feddan of rice in Aweil Rice Scheme.
b) Urea and diammonium phosphate (DAP) fertilisers used in IFDC (International Fertilizer Development Company) trials in Central and Eastern Equatoria.
c) Pilot use of DAP (50kg/feddan) to counteract *striga* by Savannah Farmers Cooperative in Central Equatoria.
d) Pilot use of DAP on "FARM" demonstration plots in East Equatoria and, possibly elsewhere.
e) Contract "on-the-hoof" dunging of farm fields in Northern Bahr el Ghazal, Warrap and Jonglei by pastoralist herds and flocks.
f) Own animal dung/household waste spreading on the valued crops/vegetables close to the homestead is practised in all states, with farmyard manure use well-regarded in farms in Northern Bahr el Ghazal, where goat-dung is noted to be differentially distributed to combat the effects of falling fertility and or *striga*.
g) The planting of valuable crops in cattle camps, a procedure noted from Jonglei to Kajo-Keji to Lakes.

3.2.3 Pests, diseases and weeds

In neither the traditional smallholder sub-sector nor the mechanized sub-sector were any infestations of migratory pests noted or reported to the Mission this year. However, the main threat to late maturing sorghum, migratory Quelea quelea birds, does not materialise until January. This year aerial spraying of nesting sites conducted in Sudan may have pushed the birds south. The ground–based, tree-spraying teams in Upper Nile State are reported to have sprayed later than required, but the only additional information provided was that the threat of infestation remains over the un-harvested sorghum and millet in the Renk mechanized areas.

Common non-migratory pests noted include: local birds, rodents, termites, millipedes, foxes, monkeys, grasshoppers, termites, stem-borer and dura-bugs (*um sharaba/manu*). Stem–borer (stalk-borer) is noted to be prevalent in the second season maize crops in Central Equatoria, probably exacerbated by continuous relay cropping of maize, up to three times per year, with no rotation. It is unclear if this year the dura-bug sites were sprayed prior to the beginning of the season in April and May in Renk, Jalhak and Melut. No other plant protection activities are noted in either sector throughout the south.

Regarding weeds, the main problems in a good rainfall year such as this one, as noted by the average or greater than average vegetation indices, are caused by the local grasses that invade fields. The Mission noted that weeding once, twice and even three times was conducted throughout the traditional sector to get the best possible crops from the improved conditions and, perhaps, once in the mechanized schemes in Renk[7]. Striga is noted to be less of a concern this year given the peace-induced, increased opportunity to shift areas of cultivation. Where farmers have continued to dig or plough exhausted plots, the plant parasite remains a problem that may be addressed by the use of fertiliser and manure. The negative effect of Striga may be partially by-passed by transplanting seedlings at 3-4 weeks old from nurseries or striga free fields.

Regarding plant diseases, the major problems remain the same as in previous years comprising rosette virus and leaf spot of groundnuts, mosaic virus of cassava and sorghum smut.

3.3 Agricultural production in 2012

3.3.1 Cereal production

A. Traditional smallholder sector

Estimates of 2012 cereal production in the traditional sector, disaggregated by states and counties, are presented in Table 7. National gross cereal production in 2012 is estimated at about 954 000 tonnes. Post-harvest losses and retention of seed for sowing in 2012 are assumed to account for 20 percent of

[7] SMoA claim 3 times weeding of mechanized schemes which would suggest a labour requirement of about 2 million person days for 200 000 ha.

this total, leaving a net amount of about 763 000 tonnes available for local consumption. This good result is about 35.5 percent more than last year's net output of 563 000 tonnes and about 6.3 percent above last five years average.

Cereal production is determined by multiplying yield per unit area by the disaggregated area estimates described in section 3.1 taking into account:

- Yields of cereal crops already harvested in August and September, including maize and the short-cycle sorghum landraces *Cham*, *Nanjung*, *Rapjung, Abele* (Bahr el Ghazal), *Leuwalding* (Upper Nile), *Ossingo* (East Equatoria) and *Kelle* (Central Equatoria).
- Yields of cereal crop from the on-going harvests, which have been directly assessed by the Mission, comprising the medium-cycle sorghum landraces *Alep Cham*, *Nyethin*, *Nyandok, Rabdit, Aleul* (Bahr el Ghazal), *Atari* (East Equatoria) and *Ladoka* (Central Equatoria).
- Yields of the long-cycle sorghum landraces to be harvested in December-January and short-cycle landraces planted in September and October, which are very conservatively predicted from the plant populations, maturity and overall quality of the standing crop in various vegetative stages. This third group includes the main local landraces of *Mabior* (West Bahr el Ghazal), A*iyella* (Warrap), *Kec* (Lakes), *Gude* (East Equatoria) *Agono* (Upper Nile), and *Serena*, *Bedele, Barre* and *Nyrangu* (West Equatoria).

Each year the Mission derives an estimate for the weighted average yield of cereal in each state built up from disaggregated data compiled at county level. The process involves studying the factors that have affected yield during the season, such as rainfall, seed supply, cultivation and weeding (timing and methods), use of inputs, pest and disease challenges, local security conditions and access to credit for mechanized farming. Such information is gained from detailed case studies with sample farmers and key informant interviews and is combined with Mission observations using South Sudan's Pictorial Evaluation Tool (PET) during vehicle and walking transects. PET based observations are often cross-checked by weighing of crop-cut samples. This empirical data is then reviewed in the context of secondary data from reports from GOSS and NGO sources and satellite images for the current season compared with previous seasons and the long-term average.

Where crops were already harvested at the time of the Mission but not threshed, which was the case for early maturing crops in Greater Bahr el Ghazal, observation of the farmstead granaries combined with measurements of the harvested area have often provided credible information on yields. In particular, the following approaches have been used:

- yield spot-checks by weighing random samples of stored heads[8] to estimate production per plant and multiplying the average value of grain per head by the densities of *harvested stems* per square metre, as determined by the cut stalks in the stubble, from which data yields per hectare at each site were derived;
- estimating the volume of sorghum heads in the household stores, determined the weight of grain per unit volume and cross-referenced the findings with the area harvested.

As shown in Table 6, average cereal yield is estimated at 0.88 tonne/hectare, about 7.3 percent higher than last year's estimates. However, the yield figures mask a range included in the calculations from 0.4 tonne/ha in Unity State to 1.25 tonne/ha in Western Equatoria State. A cereal production time series for the last five years is given in Table 7.

[8] Using techniques recommended for sampling heaps.

Table 6: South Sudan - Estimated cereal harvested area, yield, production, consumption and balance (traditional sector) in 2012

State/County	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Central Equatoria	**147 859**	**0.93**	**137 643**	**110 114**	**1 395 905**	**179 194**	**-69 080**
Returnees to 2012	5 228	0.65	3 398	2 719	134 614	18 174	-15 456
Juba	32 422	0.80	25 938	20 750	425 629	59 589	-38 838
Kajo Keji	35 759	1.10	39 335	31 468	224 490	26 939	4 529
Lainya	10 241	0.71	7 271	5 817	102 078	12 249	-6 433
Morobo	12 550	0.90	11 295	9 036	118 407	14 209	-5 173
Terekeka	25 061	0.95	23 808	19 046	160 458	19 255	-209
Yei	26 598	1.00	26 598	21 278	230 228	28 779	-7 500
Eastern Equatoria	**130 447**	**1.08**	**140 963**	**112 771**	**1 059 862**	**131 364**	**-18 594**
Returnees to 2012	1 511	0.75	1 133	907	24 253	3 032	-2 126
Budi	14 238	0.90	12 814	10 251	113 375	13 605	-3 354
Ikotos	18 149	1.10	19 964	15 971	96 745	12 093	3 878
Kapoeta East	16 334	1.20	19 601	15 681	187 431	23 429	-7 748
Kapoeta North	8 862	1.20	10 635	8.508	117 814	14 727	-6 219
Kapoeta South	6 574	1.20	7 889	6 311	90 826	11 807	-5 496
Lafon	14 598	0.90	13 138	10 511	121 332	14 560	-4 049
Magwi	31 486	1.00	31 486	25 189	194 094	23 291	1 898
Torit	18 695	1.30	24 304	19 443	113 993	14 819	4 624
Jonglei	**107 623**	**0.66**	**71 281**	**57 025**	**1 659 070**	**177 751**	**-120 726**
Returnees to 2012	6 710	0.45	3 020	2 461	106 327	11 696	-9 280
Akobo	10 456	0.70	7 319	5 855	155 674	17 125	-11 269
Ayod	9 181	0.65	5 968	4 774	159 185	16 714	-11 940
Bor South	15 586	0.70	10 910	8 728	252 701	29 060	-20 332
Duk	5 012	0.50	2 506	2 005	74 960	7 871	-5 866
Fangak	10 187	0.60	6 112	4 890	125 867	13 216	-8 327
Khorflus/Pigi/ Cnl	8 363	0.60	5 018	4 014	113 225	11 889	-7 875
Nyirol	9 014	0.60	5 408	4 327	124 203	13 663	-9 336
Pibor	4 239	1.00	4 239	3 391	169 692	17 817	-14 426
Pochalla	5 760	1.20	6 912	5 530	75 661	7 566	-2 036
Twic East	7 258	0.60	4 355	3 484	97 545	10 730	-7 246
Uror	15 857	0.60	9 514	7 611	204 029	20 403	-12 792

State/County	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Lakes	**90 880**	**0.91**	**82 948**	**66 358**	**879 012**	**91 607**	**-25 249**
Returnees to 2012	5 007	0.5	2 504	2 003	83 864	8 387	-6 384
Awerial	2 353	0.81	1 906	1 525	53 763	5 376	-3 851
Cueibet	18 027	0.8	14 422	11 537	134 582	13 458	-1 921
Rumbek Centre	13 435	0.8	10 748	8 599	175 492	19 305	-10 706
Rumbek East	15 148	1.04	15 754	12 603	140 385	14 039	-1 435
Rumbek North	4 836	0.8	3 869	3 095	49 613	4 961	-1 866
Wulu	6 869	0.95	6 526	5 221	46 344	4 634	587
Yirol East	8 960	1.08	9 677	7 741	77 033	8 474	-733
Yirol West	16 243	1.08	17 542	14 034	117 935	12 973	1 060
N Bahr el Ghazal	**107 274**	**0.87**	**90 911**	**72 729**	**971 243**	**106 837**	**-34 108**
Returnees to 2012	5 531	0.5	2 765	2 212	147 330	16 207	-13 995
Aweil Centre	1 209	0.8	967	774	47 804	5 258	-4 485
Aweil East	47 459	0.8	37 967	30 374	354 208	38 963	-8 589
Aweil North	19 680	0.9	17 712	14 169	147 579	16 234	-2 064
Aweil South	9 480	0.8	7 584	6 067	84 353	9 279	-3 212
Aweil West	23 916	1.0	23 916	19 132	189 969	20 897	-1 764
Unity	**42 092**	**0.40**	**16 837**	**13 469**	**872 734**	**76 345**	**-62 876**
Returnees to 2012	9 618	0.4	3 847	3 078	203 224	18291	-15 213
Abiemnhom	802	0.4	321	257	19 443	1652	-1 396
Guit	1 721	0.4	688	551	37 721	3206	-2 655
Koch	3 575	0.4	1 430	1 144	85 561	7273	-6 129
Leer	2 814	0.4	1 125	900	60 598	5151	-4 251
Mayendit	3 153	0.4	1 261	1 009	61 469	5225	-4 216
Mayom	8 510	0.4	3 404	2 723	137 965	11727	-9 004
Panyijar	3 899	0.4	1 559	1 248	57 971	4928	-3 680
Pariang	5 119	0.4	2 048	1 638	94 224	8009	-6 371
Rubkona	2 882	0.4	1 153	922	114 559	10883	-9 961
Upper Nile	**80 083**	**0.59**	**47 057**	**37 645**	**1 160 458**	**96 875**	**-59 230**
Returnees to 2012	2 547	0.21	535	428	58 300	4 959	-4 531
Baliet	3 817	0.6	2 290	1 832	54 871	4 390	-2 558
Fashoda	4 711	0.6	2 827	2 261	41 736	3 339	-1 077
Longochuk	3 674	0.6	2 204	1 764	72 192	5 776	-4 012
Luakpiny/Nasir	15 423	0.6	9 254	7 403	240 011	19 201	-11 798
Maban	4 362	0.6	2 617	2 094	51 702	4 136	-2 042
Maiwut	4 650	0.6	2 790	2 232	90 817	7 265	-5 033
Malakal	4 217	0.6	2 530	2 024	144 557	13 732	-11 708
Manyo	4 466	0.6	2 680	2 144	43 442	3 476	-1 332
Melut	5 095	0.6	3 057	2 446	56 279	4 503	-2 057
Panyikang	2 016	0.6	1 210	968	51 919	4 153	-3 186
Renk	18 967	0.6	11 380	9 104	157 435	14 169	-5 065
Ulang	6 136	0.6	3 682	2 945	97 197	7 776	-4 830

State/County	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
W Bahr el Ghazal	**56 635**	**1.00**	**56 460**	**45 168**	**446 123**	**50 183**	**-5 015**
Returnees to 2012	3 560	0.9	3 204	2 563	64 720	7 119	-4 556
Jur River	16 608	0.9	14 947	11 957	146 154	16 077	-4 120
Raga	7 221	0.85	6 137	4 910	62 158	6 216	-1 306
Wau	29 247	1.1	32 172	25 737	173 091	20 771	4 967
Warrap	**163 603**	**0.68**	**110 886**	**88 709**	**1 193 365**	**116 203**	**-27 494**
Returnees to 2012	3 242	0.45	1 459	1 167	80 461	8 048	-6 881
Abyei	2 631	0.68	1 789	1 431	60 491	5 444	-4 013
Gogrial East	16 247	0.75	12 185	9 748	118 143	11 224	-1 476
Gogrial West	38 970	0.77	30 007	24 005	279 014	29 297	-5 292
Tonj East	20 838	0.45	9 377	7 502	132 828	13 283	-5 781
Tonj North	30 333	0.65	19 716	15 773	188 993	18 899	-3 126
Tonj South	15 341	0.68	10 432	8 345	99 050	8 914	-569
Twic	36 002	0.72	25 921	20 737	234 385	21 095	-358
Western Equatoria	**157 557**	**1.25**	**196 737**	**157 389**	**731 098**	**106 009**	**51 380**
Returnees to 2012	1 070	1.15	1 231	985	23 008	3 336	-2 352
Ezo	25 105	1.3	32 636	26 109	92 495	13 412	12 697
Ibba	14 291	1.2	17 149	13 720	47 893	6 944	6 775
Maridi	17 340	1.2	20 808	16 646	94 325	13 677	2 969
Mundri East	7 631	1	7 631	6 105	55 269	8 014	-1 909
Mundri West	4 937	1	4 937	3 949	38 863	5 635	-1 686
Mvolo	8 042	1.25	10 052	8 042	55 059	7 984	58
Nagero	2 957	1.1	3 252	2 602	11 527	1 671	930
Nzara	22 582	1.3	29 356	23 485	75 166	10 899	12 586
Tambura	18 633	1.3	24 223	19 378	63 331	9183	10 195
Yambio	34 970	1.3	45 461	36 369	174 163	25254	11 115
SOUTH SUDAN	**1 084 053**	**0.88**	**951 723**	**761 378**	**10 368 871**	**1 132 369**	**-370 991**

Table 7: South Sudan - Cereal harvested area and net production in the traditional sector, 2008-2012

Zones/States	2008			2009			2010			2011			2012 estimate		
	Area ('000 ha)	Net Prod. ('000 t)	Yield (t/ha)	Area ('000 ha)	Net Prod. ('000 t)	Yield (t/ha)	Area ('000 ha)	Net Prod. ('000 t)	Yield (t/ha)	Area ('000 ha)	Net Prod. ('000 t)	Yield (t/ha)	Area ('000 ha)	Net Prod. ('000 t)	Yield (t/ha)
UPPER NILE	**237**	**237**	**1.00**	**218**	**90**	**0.41**	**261**	**156**	**0.60**	**230**	**99**	**0.43**	**230**	**108**	**0.47**
Upper Nile	79	67	0.85	77	34	0.44	78	49	0.63	68	26	0.38	80	38	0.59
Unity	43	42	0.98	37	18	0.49	40	24	0.60	34	8	0.24	42	13	0.40
Jonglei	115	126	1.10	104	38	0.37	143	84	0.59	128	65	0.51	108	57	0.68
BAHR EL GHAZAL	**292**	**342**	**1.17**	**298**	**223**	**0.75**	**319**	**254**	**0.82**	**263**	**166**	**0.63**	**419**	**273**	**0.65**
N Bahr el Ghazal	59	44	0.75	71	49	0.69	79	60	0.76	68	40	0.59	107	73	0.68
W Bahr el Ghazal	34	52	1.53	39	30	0.77	37	34	0.92	41	35	0.86	57	45	0.79
Lakes	84	101	1.20	69	53	0.77	76	66	0.87	70	45	0.65	91	66	0.66
Warrap	116	145	1.25	119	90	0.76	126	94	0.75	84	46	0.55	164	89	0.54
GREATER EQUATORIA	**323**	**490**	**1.52**	**335**	**228**	**0.68**	**343**	**284**	**0.83**	**366**	**297**	**0.81**	**434**	**380**	**0.88**
Central Equatoria	131	201	1.53	121	72	0.60	127	93	0.73	123	78	0.63	148	110	0.93
Eastern Equatoria	85	94	1.11	98	53	0.54	103	79	0.77	115	99	0.87	130	113	1.08
Western Equatoria	107	196	1.83	116	102	0.88	112	112	1.00	129	120	0.93	158	157	1.37
SOUTH SUDAN	**853**	**1 068**	**1.25**	**852**	**541**	**0.63**	**921**	**695**	**0.75**	**860**	**563**	**0.65**	**1 084**	**761**	**0.70**

B. Mechanized sector

South Sudan's rain-fed mechanized sector, includes the demarcated large-scale farmers in Upper Nile State; the un-demarcated *traditional* tractorized farmers of Renk and Malakal who hire tractors from the large-scale farmers; small areas practising similar systems in Unity State, and three recorded schemes in Greater Bahr el Ghazal and one in Kajo Keji. There are also mechanized areas in other states, particularly Greater Equatoria, but they are unaccounted for in the assessments.

Mechanization is limited to land preparation, all other operations from sowing to harvesting being carried out by hand. In Renk and Malakal and in the locations in-between these two locations, trader-farmers follow a low-cost, low-output farming system used extensively in Sudan and derived by other larger–scale farmer-traders, which covers millions of hectares across the eastern and central clay plains, and may be best described as *mechanized shifting cultivation*.

Individual farms can cover several thousands of hectares that are cultivated with this simple system, which involves a single pass of disc harrows, followed by broadcast sowing of sorghum or sesame seeds, eventually followed by a second pass with the same disc harrows.

As disc harrows can cover 2 hectares per hour, an 80 hp tractor working 10 hour per day can prepare 20 hectares per day, if access to the mostly clay soils is possible. This means that with a tractor force of 100 units working 10 hour days, 200 000 hectares may be prepared for sowing in 100 days. Rudimentary hand-sowing of 1 hectare of sorghum takes about 2 hours in reasonable walking conditions, so sowing 200 000 hectares will take some 40 000 person days. By the same token, hand weeding 1 hectare demands much more labour, which varies according to the season. As rains have been were favourable in 2012, weeds flourished and would need some 50 person hours per ha to be removed, or 5 people working 10 hours per day. At this rate, one weeding pass over 200 000 hectares requires 1 million person-days, suggesting that perhaps, at best, one weeding pass will have been achieved over the most promising crops, while the remainder will have been left un-weeded, lowering the expected yield.

This year, the national mechanized grain area (cereals and oilseeds) is estimated at approximately 240 000 hectares. About 75 percent of this is sorghum with the remaining 25 percent made up of sesame and bulrush millet. Most of the 180 000 hectares of sorghum and all of the other crops are noted to be in Renk; and the area presents an increase of 14 percent on last year's estimates (210 000 ha) despite problems with access to fuel and spare parts due to the closure of the border with Sudan. According to the Upper Nile SMoA, The Agricultural Bank (SS) supported some 40 farmers with credit for fuel and weeding, with another tranche expected for harvesting costs. Other areas of mechanized farming contribute a very small amount, about 5000ha in total, spread through Unity, Northern Bahr-el-Ghazal (Aweil) and Central Equatoria (Kajo-Keji).

On all the large farms, harvesting is opportunistic. At harvesting, the farmer will assess which parts of the crop to harvest and which parts to abandon, taking into consideration the cost of manual harvesting[9], the estimated yield and the prevailing market price.

In previous years, most of the produce from these large farms went north to Kosti in Sudan for distribution to major markets such as El Obeid, Omdurman and by barge to Malakal, Bor, Juba and the Sobat corridor. This is unlikely to have changed this year, but verification of the final destination of the production from the mechanized farms of Renk together with a detailed analysis of current trade patterns would be needed.

The estimated overall yield of short and long maturing sorghum varieties in Renk is put at 0.6 t/ha, similar to the traditional small-holder sector and with an increase of 50 percent from the very low yield of the previous season (0.4 ton/ha). A factor that is expected to have a negative impact on the yield of sorghum in Renk and Malakal is the lack of aerial spraying of the nesting sites of *Quelea quelea* birds. This was formerly carried out by the Sudanese authorities as a means of controlling population growth of *quelea*, which can devastate sorghum crops shortly before harvest. Ground-based tree spraying has apparently been conducted but no details of the coverage are available. The Mission Team

[9]Picking and collecting sorghum heads- "more than sowing- less than weeding, depending on the crop".

visiting Renk reported sowing in June, July and August and that short-maturing, *feterita* varieties of *Wad Ahmed*, *Afergadamech* and *Goddam el hamam* now cover most of the planted area: as a consequence, much of the harvest will probably be collected (if not threshed) before the bird threat may materialise.

Cereal production from the rain-fed mechanized sector in Upper Nile and Unity States is put at an average level of about 108 000 tonnes. In Northern Bahr el Ghazal, the Tonchol and APADA (Udham) sorghum schemes are expected to produce a further 3 276 tonnes from 2 500 hectares; maize production in mechanized units in Kajo Keji (Savannah Coop) plus out-growers adds an additional 2 265 tonnes; and the Aweil Rice Scheme, with yields this year expected to be 0.84 tonnes/ha from 840 hectares adds a further 700 tonnes or so to the cereal balance. Summing all these amounts gives a total of approximately 114 000 tonnes, not far from double that of last year (66 500 tonnes), which connects to an extra 91 200 tonnes net (considering 20 percent losses and seed use).

3.3.2 Other crops

Grown on small-holder farms, cassava provides a food safety net across the country south of Raga and Wau, the importance of which increases towards the south and west, with the highest concentration of crops found in the Greenbelt in Greater Equatoria, where it is, grown as the last crop in a rotation that includes maize (2 times per year), groundnuts and sorghum. It is not usually weeded during its second year, so may often be mistaken as an “abandoned” crop[10]. Cassava is traded locally in the form of tubers, and farther from the farms as dried cassava chips or cassava flour.

The main constraints to the expansion of the crop are erratic rainfall patterns. Cuttings for planting are usually abundant In suitable agro-ecological zones, although mosaic disease resistant varieties are less widely available. In Rumbek, the crop is planted around plot and household boundaries. In Wau and Raja, it is planted either as a sole crop or intercropped with sorghum and sesame. In Western and Central Equatoria, it is intercropped with a wide range of crops including cereals, sesame, groundnuts, pigeon-peas and beans during the first year of its development. Both sweet and bitter cassava varieties are grown as they have different maturation periods, ranging from 12 to 24 months. Most farms follow the two-year cycle harvesting tubers from 18-24 months. Yields vary significantly with the agro-ecology and plant densities.

This year, the Mission has attempted to quantify cassava production for the first time by calculating probable area to be harvested and assigning yields based on PET transect observations regarding (a) the prevailing cropping system, (b) plant density and (c) spot-checked yields per plant that have been conservatively extrapolated to give an indicative performance for the crop in each state. Table 9 shows estimates of area and production for both cassava and groundnuts, which confirm the importance of the two crops.

[10] This does not preclude occasions of non-use in areas of surplus and no markets.

Table 9: South Sudan - Indicative performance estimates of cassava and groundnuts by state

States	Cassava (2 years)			Groundnuts		
	Area (ha)	Yield (t/ha)	Production (fresh, t)	Area (ha)	Yield (t/ha)	Production (unshelled, t)
Central Equatoria	15 002	15	225 030	36 140	0.6	21 684
Eastern Equatoria	14 072	12	168 864	22 247	0.6	13 348
W. Equatoria	38 671	18	696 078	34 077	0.6	20 446
Jonglei	0	0	0	14 814	0.5	7 407
Upper Nile	0	0	0	0	0	0
Unity	0	0	0	3 360	0.4	1 344
Lakes	5 083	10	50 830	16 481	0.5	8 241
Warrap	0	0	0	32 692	0.5	16 346
W Bahr al Ghazal	5 158	12	61 896	10 605	0.6	6 363
N Bahr al Ghazal	0	0	0	20 514	0.5	10 257
SOUTH SUDAN	**77 986**	**15**	**1 202 698**	**190 930**	**0.55**	**105 436**

Regarding other field crops grown at household level, information on oilseeds (sesame, safflower and sunflower) is too scanty to try deriving production figures. However, the 63 000 hectares of sesame from the mechanized sector in Renk might be expected to produce some 16 000 tonnes for export.

3.3.3 Livestock

The livestock sector is extremely important in South Sudan for both economic and social reasons. The most recent documented estimate of cattle numbers, made by FAO in 2009, suggests a cattle population of 11.7 million head, similar to contemporary population estimates of sheep and goats at around 12 million head each. The Mission's key informant from MoARD considered that, although livestock numbers were thought to be increasing, no estimates were available to suggest by how many head per annum. Mission observations suggest that, for cattle, 1) with the age at first calving being at least 3 years, 2) with retention of male sales/slaughter stock for several years (<5 years) before sale or slaughter, and 3) a death rate of adult cows at 10 percent per annum, breeding cows are unlikely to make up more than 30-35 percent of the estimated numbers noted above. Furthermore, with calving intervals of 3 years and a high death rate of young stock (15-20 percent), any unit of 100 head is unlikely to produce more than seven viable heads per annum, a replacement rate that matches herd adult mortality and off-take may occur in any one year. Therefore, the conservative livestock population growth rates used in Ethiopia for cattle at 0.06 percent can be applied for South Sudan. Table 10 shows estimates of cattle numbers obtained using the above mentioned growth rate.

Table 10: South Sudan - Revised cattle numbers (thousands) by state, 2009-2012

States	2009	2010	2011	2012
Central Equatoria	878	879	879	880
Eastern Equatoria	888	889	889	890
Western Equatoria	675	675	676	676
Jonglei	1 465	1 466	1 467	1 468
Upper Nile	983	984	984	985
Unity	1 180	1 181	1 181	1 182
Lakes	1 311	1 312	1 313	1 313
Warrap	1 528	1 529	1 530	1 531
Western Bahr el Ghazal	1 248	1 249	1 249	1 250
Northern Bahr el Ghazal	1 579	1 580	1 581	1 582
South Sudan	**11 735**	**11 742**	**11 749**	**11 756**

Source: Mission (CFSAM, 2012) from FAO livestock population estimate (2009).

Similarly low estimates for agro-pastoralist flocks of sheep and goats at 0.1 to 0.4 percent per annum used in Ethiopia are also likely to apply to the agro-pastoralist herds and flocks in South Sudan. Therefore, corresponding calculations for sheep and goats have been made, that suggest that the current population (2012) of small ruminants may be in the order of 24.2 million head.

With regard to the applicability of these data, no progress has been made on identifying indicator units of breeding females within herds, whose reproductive performance could be monitored throughout the year using simple farmer/herder run records in selected zones[11], thereby building on the data collected by livestock researchers in Sudan in the late 1970s and early 1980s[12]. Such records could then be analysed to produce regular sets of indicators such as birth rates (calving and lambing percentages), adult and postnatal death rates, weaning percentages, calving intervals and other performance related indicators that might provide an insight into livestock production for the year in question.

More information regarding health, pasture, water, animal body condition and sales is available from MoARD (FAO Liaison Officer) and from VSF, Belgium and collected by Mission teams and can be summarised as follows:

1) Nationally, the grazing systems are intact and the general transhumance pattern of movement is being accomplished without any significant changes noted. However, in Jonglei, a major disruption to migration patterns resulting from cattle raiding and ensuing conflict is noted.
2) Mission teams reporting from 47 counties confirm readily available water and abundant pasture in most locations. As against this, i) the Mission team visiting Boma notes that secure areas in Jonglei have been subject to heavy grazing, while insecure/disputed areas have been left un-grazed; ii) VSF report an early movement of livestock in Lakes due to shortages of pasture and water, however, the summary NDVI of Lakes present a general picture of greater than average vegetation development from March onwards that has continued to October in Lakes and the neighbouring states.
3) All Mission teams report that the body condition of livestock, assessed during transects travelled through the 47 counties, is noted to be good (PET Body Condition 3 to 4). NB-where a distinction was made between milking and non-milking livestock of any of the species, the milkers were invariably scored slightly lower at PET Body Condition 2-3. In general, the returns confirm reasonable access to feed and water at this stage in the annual cycle.
4) Increased livestock prices are reported across the country, clearly indicating a firm market and sufficient available pasture and water resources to encourage herders to retain breeding stock and traders to retain store stock to fatten to utilise the pasture while it exists.
5) Incidents of endemic diseases noted include haemorrhagic septicaemia (HS), black-quarter (BQ), contagious bovine pleuropneumonia (CBPP), anthrax, East Coast Fever (ECF), peste des petits

[11] Recommended previously in CFSAMs.
[12] WSARP (Western Sudan Agricultural Research Project).

ruminants (PPR), sheep pox (SP), Newcastle disease (ND), contagious caprine pleuropneumonia (CCPP), foot and mouth disease (FMD), lumpy-skin disease, and the presence of internal and external parasites. In the reports from VSF, Belgium specific mention is made of:

- HS in Lakes, Warrup-vaccination noted; Upper Nile-vaccination noted; and Jonglei-no vaccination because of transport problems.
- PPR in Upper Nile-vaccination noted; Warrap-vaccination noted and Jonglei no vaccination because of transport problems.
- CCPP in Upper Nile-vaccinated noted (and for CBPP); Jonglei-no vaccination because of transport problems.
- BQ in Upper Nile-vaccination noted; Warrap-vaccination noted.
- ECF in Warrap; and Jonglei-investigation/treatment noted.

No developments are noted regarding production from non-ruminant livestock. Poultry and pig production occurs at backyard level. Any development from small scale laying/broiler or pig production units into commercial enterprises remains undocumented, but their emergence will depend on identifying reliable sources of locally-produced carbohydrates. A maize growing/processing unit in Kajo Keji visited by the Mission team, is one example of an enterprise looking to diversify in such directions. In this regard, it is surprising that more attention is not given to the availability of cassava growing in quantity in the Greenbelt. Fishing is considered to have a significant effect on diet throughout the riverine and swamp counties. Nationally, the annual catch is estimated to be between 40 000 and 45 000 tonnes.

4. CEREAL SUPPLY/DEMAND SITUATION

4.1 Cereal balance

As already shown in Table 7, total cereal consumption in 2013 is estimated at about 1.13 million tonnes, using a projected 2013 mid-year population of about 10.4 million people and an average per capita consumption of 109 kg of cereals per year. Estimates of cereal per capita consumption are based on information provided by the 2009 National Baseline Household Survey (NBHS) at state level and adjusted at county level to take into account differences between urban and rural areas and the relative importance in local diets of other crops (notably cassava and groundnuts), livestock and wild foods. In particular, the estimated production of 1.2 million tonnes of fresh cassava and 105 400 unshelled groundnuts is expected to provide some 463 000 tonnes of grain equivalent, boosting estimated average per capita consumption to 154 kg of cereal equivalent per year, suggesting a level fairly close to estimates for neighbouring countries.

With an estimated net cereal production from the traditional sector of approximately 761 000 tonnes, a cereal deficit of about 371 000 tonnes is forecast for the 2013 marketing year, about 25 percent less than last year's estimate. Table 11 summarizes the estimated cereal supply situation for each state in 2013 and compares it with the Mission's estimates for the previous two years. As in the past, the largest shortfall in 2013 is forecast in Jonlgei state, with about 120 000 tonnes. Only Western Equatoria state is expected to register a surplus, while Western Bah el Ghazal state shows a relatively small deficit. At county level, even, in states expected to be in deficit, surpluses are expected in Kajo Keji (Central Equatoria); Ikotos, Magwi and Torit (Eastern Equatoria); Wulu and Yirol West (Lakes); and Wau (Western Bahr el Ghazal).

Table 11: South Sudan - Estimated cereal surplus/deficit in 2011-2013

States	2011	2012	2013
Central Equatoria	-63 878	-86 861	-69 080
Eastern Equatoria	-42 777	-26 701	-18 594
Western Equatoria	24 179	30 380	51 380
Jonglei	-74 259	-98 487	-120 726
Upper Nile	-37 443	-67 172	-59 230
Unity	-33 992	-58 161	-62 876
Lakes	-17 905	-42 288	-25 249
Warrap	-10 219	-58 241	-27 494
Western Bahr el Ghazal	-7 700	-9 719	-5 015
Eastern Bahr el Ghazal	-26 998	-56 404	-34 108
South Sudan	**-290 993**	**-473 653**	**-370 991**

As in the past, cereal production from the mechanized sector is expected to be commercialized in Sudan, given the very high transportation costs of shipping grains to main markets in South Sudan. However, this production may represent an interesting option for local purchases by international institutions providing food assistance.

4.2 Cereal and livestock markets

Prices of locally produced sorghum and maize normally decline in September/October following the start of the main harvest (which is usually completed in February) and remain generally stable through to March, before rising and peaking in August/September. As illustrated in Figure 4, nominal retail prices of white sorghum have risen sharply, above normal seasonal increases, since mid-2011, reaching record levels in June/July 2012. Then, prices have started to decline in August, a few weeks earlier than usual, as the good prospects for current crops became apparent and traders decided to gradually release their stocks. Price declines continued in following months, benefiting from increased supplies of newly harvested crops and diminished demand by households due to increased consumption of own production. Between July and November, sorghum prices declined by 12-15 percent in Juba and Rumbek, while they dropped up to 40-60 percent in northern markets of Wau and Aweil partly due to increasing informal imports from the Sudan. However, in Juba retail market, sorghum and maize prices in November 2012 were between 40 and 50 percent above the levels of November 2011, with peaks of +60 percent in some flood affected areas in Jonglei, Northern Bahr El Gazal, Warrap and Lakes states. In these areas, widespread flooding in August/September 2012 severely affected the road network, preventing the normal delivery of supplies to local markets for long periods (up to 30 days). Wheat flour, mainly imported and consumed in urban areas, was traded in November 2012 at about SSP 6 per kg in Juba, well below the record price of SSP 8.5 per kg recorded last June, but still about 20 percent above the level of one year earlier.

Figure 4: South Sudan – Retail prices of sorghum (white) in selected markets

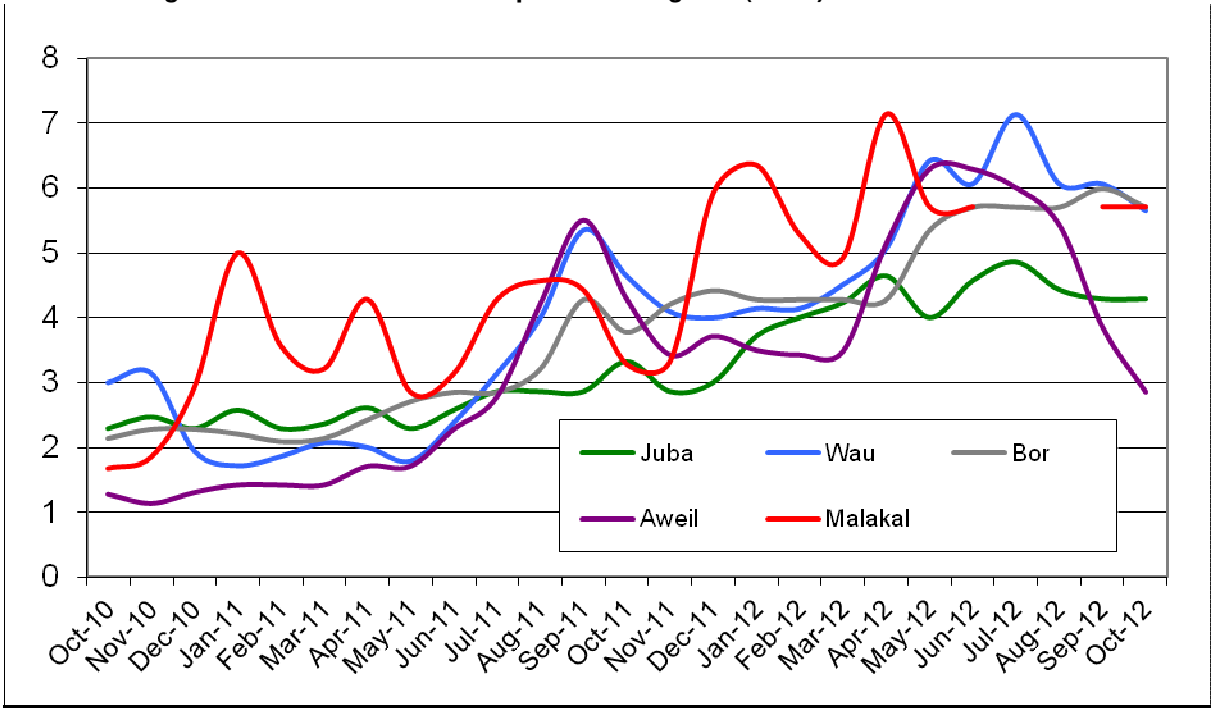
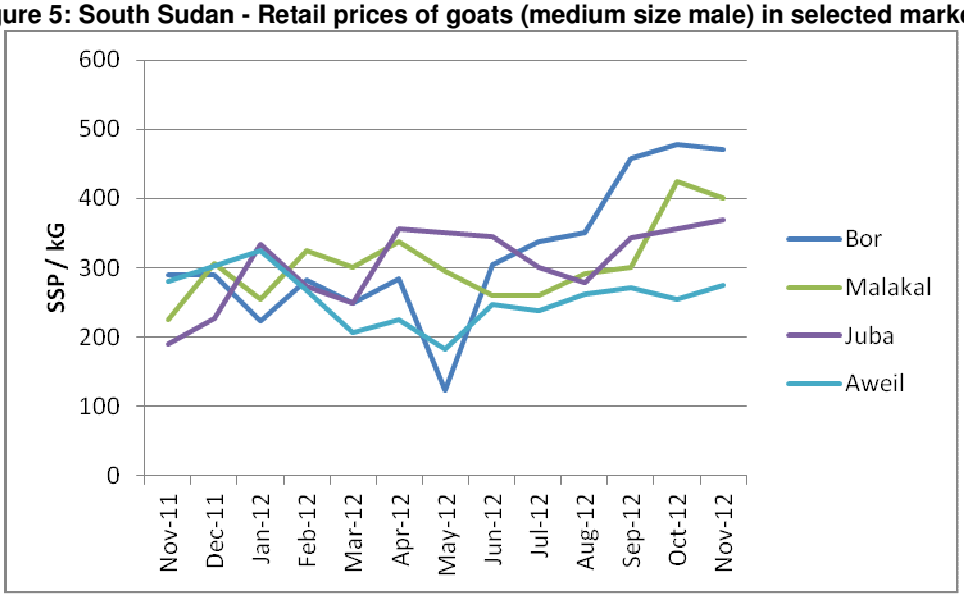


Figure 4 shows also the existence of significant price differentials between markets, illustrating limited spatial market integration and they are primarily attributed to two factors: (1) the high freight tariffs due to the poor transport infrastructure and (2) the asymmetry of trading patterns. Road density in South Sudan is among the lowest in Africa and road conditions are often patchy, especially during the rainy season (May-October) forcing trucks to carry small loads over long distances, which automatically increases the average unit cost of transportation. Regarding trading asymmetry, trade between South Sudan and Uganda/Kenya is highly asymmetric with the volume of exports from these countries being disproportionately larger than the volume of exports from Sudan. This implies that trucks transporting goods from Uganda/Kenya to South Sudan usually return back empty, doubling transport costs faced by trucking companies. Limited competition of transport services, high fuel prices and high risk factor also contribute to the high unit cost of transport in South Sudan.

Given the high degree of market segmentation, the imposition of trade restriction with Sudan since the latter half of 2011 has severely constrained local supplies in northern markets. In these areas, before the border closure, sorghum prices were traditionally 20-40 lower than in Juba, while during the last twelve months, they became about 30-50 percent more expensive due to high transportation costs, multiple check points, roadblocks and the payments of several formal and informal taxes. Positive effects on local availability of food are expected in coming months, following the implementation of the September cooperation agreement between the Sudan and South Sudan which includes the opening of ten corridors through the border and the resumption of Sudanese exports of sorghum.

Livestock forms an integral part of South Sudanese livelihood systems and sales of small ruminants represents a principal source of income that largely determine pastoralists' capacity to purchase food items.

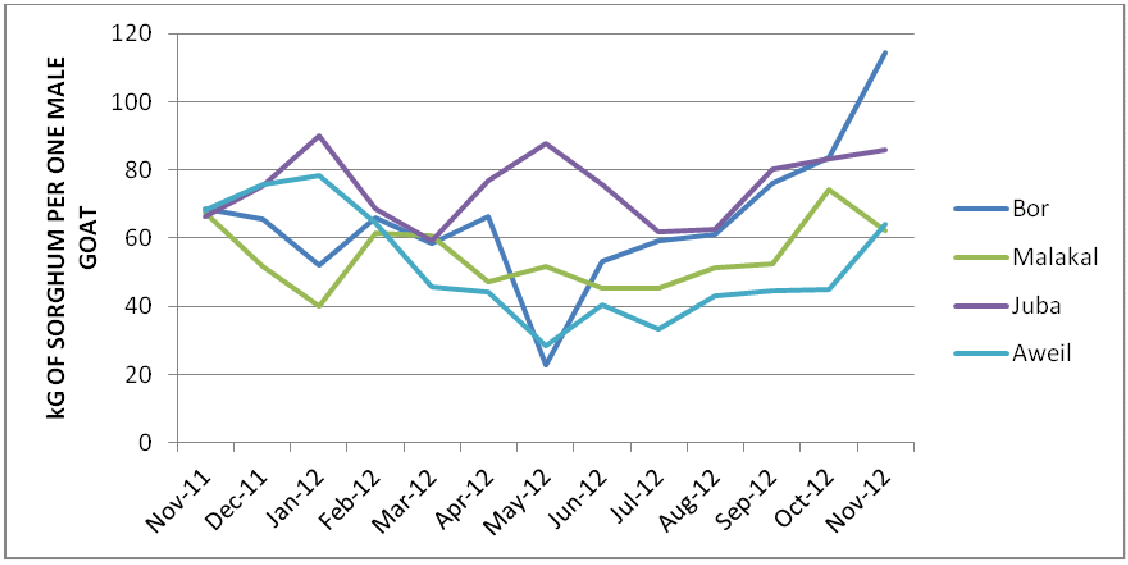
Figure 5: South Sudan - Retail prices of goats (medium size male) in selected markets



As shown in Figure 5, goat prices (male medium size) followed a normal declining trend in most markets at the beginning of 2012 as the number of animals on sale traditionally increases during the dry season and animal body conditions worsen. As seasonal rains started to gradually improve pasture and water availability in May/June, goat prices have positively reacted displaying an increasing trend and they are currently at higher levels than in the previous year across the country. According to WFP's market data, at the beginning of November 2012, the highest goat prices were recorded in Bor (Jonglei) and Malakal (Upper Nile), with near record prices of about SSP 470 and SSP 400 per head, respectively. At the same time, goats were also traded at record prices in Juba market, with about SSP 370 per head, almost doubling the price of November 2011. The Mission expects that goat prices remain high during first months of 2013 due to generally good conditions of pasture in most livestock areas.

Since August 2012, the decline of grain prices, coupled with the increase in goat prices, has improved pastoralists' purchasing power (see Figure 6). In Juba, terms of trade increased by almost 40 percent between August and November 2012 as the exchange of one medium size male goat passed from 63 to 86 kg of sorghum. In Bor (Jonglei), a steep rise in goat prices in September 2012, followed by a decline of sorghum price in November 2102, strengthened terms of trade in favour of pastoralists at very high level as a goat was traded for almost 115 kg of sorghum.

Figure 6: South Sudan - Terms of trade (sorghum per one medium size male goat) in selected markets



5. HOUSEHOLD FOOD SECURITY SITUATION

5.1 Methodology

The Mission undertook extensive field visits throughout the 10 states with the field work and information collected focused on agricultural production and its determining factors. In order to understand how agricultural production relates to food security an analysis is carried out based on data from the FSMS (Food Security Monitoring System) run by WFP and partners (FSTS, UNICEF, FAO, MOAF). This was initiated in 2010 and has established itself as the crucial source of information on the food security situation in South Sudan. The FSMS holds three rounds per year, February, June and October, thereby including the key food security stages during the season – most favourable period, October, right after or at harvest time, the least favourable in June, at the peak of the lean season and February, midway between these two stages.

Each FSMS round covers all 10 states. In each state, 10 sentinel sites have been purposively selected through a consultative process at state-level, taking into account the representation of various livelihood zones and administrative areas within each state. The same sentinel sites are revisited in each round (unless there are severe access constraints). In each site, 25 households are interviewed, resulting in a total of about 2 500 households across the country.

By October 2012, eight rounds of the FSMS had taken place with the latest round being conducted on 1-15 October just prior to the CFSAM field work (see Table 12). The next FSMS round is planned for February 2013 allowing stakeholders to evaluate how much improvement has been brought about by the more favourable growing season of 2012.

The food security analysis in this section is based on a consolidated dataset consisting of Annual Needs and Livelihood Assessments (ANLA) of late 2008 and 2009 and seven rounds of FSMS conducted between October 2010 and October 2012 (the very first FSMS round of July 2010 covered only two states).

Table 12: South Sudan - List of datasets used for the food security analysis

Data	Date	States
ANLA 2008/2009	October 2008	
ANLA 2009/2010	October 2009	CES 1/, EES, NBS, Lakes, Unity, Upper Nile, Jonglei, Warrap
FSMS 2	October 2010	EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS 3	February 2011	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS 4	June 2011	CES, WES, EES, NBS, WBS, Upper Nile, Warrap, Jonglei, Lakes
FSMS 5	October 2011	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS 6	February 2012	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS 7	July 2012	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS 8	October 2012	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei

1/ Taken March 2010.

5.2 Food security context for 2012-2013

5.2.1 Main drivers of food insecurity

The main factors that will drive the general food security situation for South Sudan in 2013 are the improved crop production and the continuing restrictions to the trade flows between Sudan and South Sudan caused by the closure of the border between the two countries. Issues arising from inter-communal and inter-ethnic conflicts and the influx of returnees from Sudan are now playing a less important role than last season.

Crop Production in 2012 – Net cereal production in 2012 (see tables in Section 3) for consumption in 2012-13 is expected to reach 761 000 tonnes, about 10 percent above the average of the previous 5 years and 35 percent above that of the last season and 6 percent above that of 2010. This leads to a cereal deficit of 371 000 tonnes, a substantial improvement relative to the previous season (deficit of 474 000 tonnes) but still worse than 2010 (deficit of 297 000 tonnes).

Sudan Border Closure – The border with Sudan remains closed, therefore disrupting what used to be a major supply route for cereal (mainly sorghum) and other trade goods into South Sudan, a factor which is of particular relevance to the northernmost states (Bahr-el-Ghazal, Warrap, Unity, Upper Nile). Although the resulting trade gap has been filled by food commodities and other goods from Uganda (mainly), the large distances involved, the extremely expensive fuel, unfavourable exchange rates, taxes both official and unofficial, keep market prices higher than they otherwise would be. The influx of grain from the current harvest has provided some relief, hence prices may not reach in mid-2013 the record highs of July 2012. While there were hopes that the state of affairs regarding the closure of the border might change[13], no progress has yet been achieved; should the border open, the bumper crop production in Sudan (said to reach over 5million tonnes) may enable a supply of cereal at favourable prices for South Sudan households in particular those in states along the border of the two countries.

Refugees, returnees, conflict and IDPs – The armed conflict in South Kordofan and Blue Nile regions has forced thousands of residents to flee from their homes into exile in South Sudan. It is estimated that some 170 000 refugees (56 000 in Unity with the rest in Upper Nile) are in camps within Unity state (56 000) and Upper Nile States (114 000) as of December 2012. This refugee population will present major food requirements for 2013 (see section on Estimated Food Assistance Requirements).

In 2011, considerable numbers of returnees from Sudan settled in South Sudan. In 2012 this flux was considerably reduced and confined to specific states: the number of returnees reduced to 151 000 people from a high of 329 000 people in 2011, with settlement taking place mainly in Upper Nile, Central Equatoria and Warrap States. This population still represents an additional cereal demand as many settled in urban or peri-urban areas; those cultivating, do so on significantly smaller plots of land which are far from providing a sufficient contribution to the household requirements.

Peaceful conditions returned to the Abyei region after major conflict and population displacement in 2011. The Mission witnessed evidence of households returning to the area, with land clearing for expansion of agricultural area under way, driven by both subsistence farming households but also by wealthier individuals with a view to explore the high agricultural potential of the local clay soils.

Incidence of internal conflict in 2012 (inter-ethnic and inter-communal) has been reduced relative to 2011 (267 conflict incidents experienced between January and November 2012 compared to 460 incidents recorded between January 2009 and June 2011). Some 65 percent of the conflict incidences were related to inter-communal conflicts, 17 percent related to armed skirmishes while 14 percent was related to border tensions. The inter-communal conflicts were mainly cattle raiding incidences. Jonglei State witnessed the majority of the conflicts and accounted for about 44 percent of populations displaced (some 117 000 people of the 173 000 displaced). The reduced incidence of conflict in other areas (see next section) has therefore contributed to the improvement in food availability as more households than last year were able to carry out cultivating without disturbance. It still remains at significant levels in Jonglei and Lakes. Floods in Jonglei (and Unity) led to the displacement of 315 000 people.

[13] Viz the declaration by President Bashir on 7/10/2012, http://www.sudantribune.com/spip.php?article44137

The factors above will characterize the food security situation in 2013 in South Sudan, affecting food availability and access at the household level:

- The better crop production will enhance household food stocks, which will lead households to access markets for food purchases at later times than last year.
- The continued unfavourable trade flow patterns will work to maintain prices at levels higher than what they would otherwise be. If the opening of the border with Sudan comes into place, a favourable impact on price patterns may be expected.

While larger stocks and the later onset of dependency on markets may improve the food security status of the population of South Sudan during 2013, the widespread poverty and the seasonal rise in prices during 2013 will prevent more substantial drops in food insecurity, unless normal trade flows with Sudan are resumed.

Geographically, these factors will have a complex interplay: whereas improvements in crop production are generalized across the country, larger production volumes arise in the Greenbelt states (West Equatoria and Central Equatoria) which are also closer to Uganda, the main source of food imports into South Sudan. This combination of higher production levels and reduced transport costs of imported goods is likely to lead to a better overall food security situation in 2013 in these regions.

In the more northern states (North and West Bahr-el-Ghazal, Warrap, Lakes, Unity, Jonglei, Upper Nile), the lingering effects of the very high levels of food insecurity reached in the last lean season, high levels of returnees and IDPs and continuing dependence of local market supplies on long range transport links will lead to more moderate and transitory improvements in food security status of households. The food security situation will improve relative to 2012, but at best it will only return to the status of mid-2011, given high cereal deficits, continuing unfavourable market conditions and the recent erosion of assets.

5.2.2 Main shocks affecting households in 2012

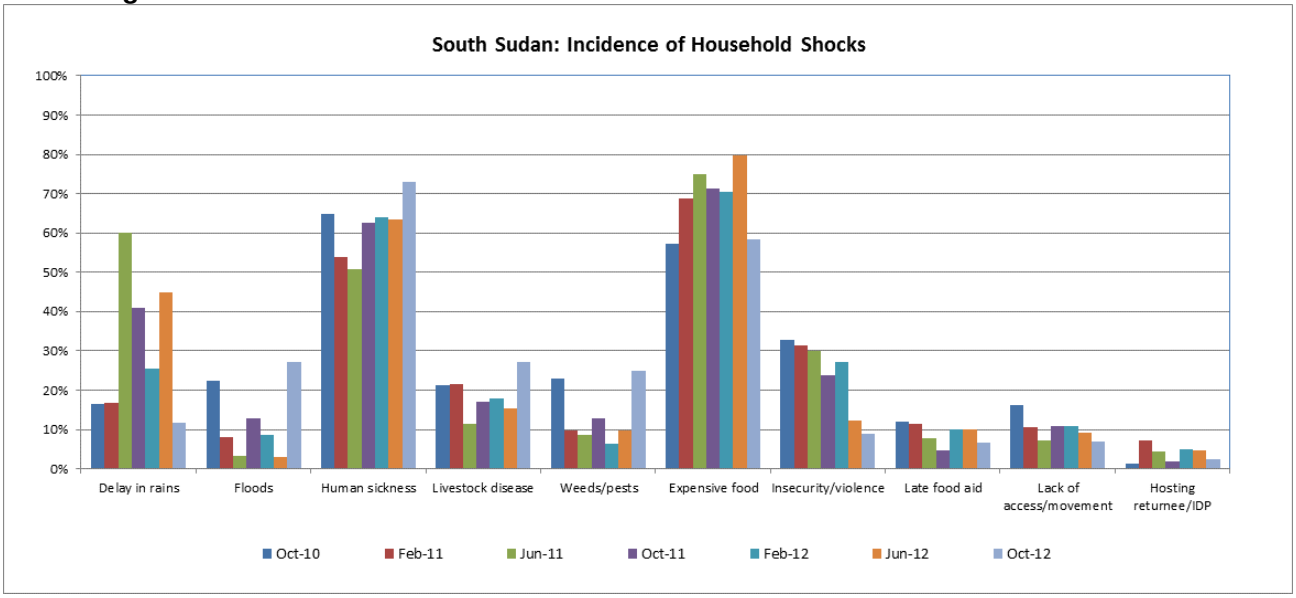
Figure 7 shows the proportion of households affected by different shocks in South Sudan between July 2010 and October 2012 (source: WFP FSMS). Overall, the chart reveals the importance of high food prices as one of the main detrimental factors for the household food security. Illness is also much in evidence while drought/floods and insecurity have been major factors in the past couple of years.

Of the natural shocks (“delay in rains”, “floods”, “human illness“, “livestock disease”, “weeds and pests”), human illness remains the most important factor affecting households. In general, an increase is noticeable from October 2011 with another increase recently (October 2012); it is currently reported at higher levels in North Bahr-el-Ghazal (consistently over 80 percent since October 2011), Lakes, Central Equatoria and Unity.

The more favourable rainfall season in 2012 (in contrast with 2011) explains some of the patterns in shocks affecting households:

- A generalized decrease in “delay in rains” as a shock affecting households (comparing month to same month between 2011-2012);
- increase in human illness may be linked to more favourable conditions (wetter) for spread of malaria;
- increased incidence of livestock disease and weeds/pests in 2012 (also linked to wetter conditions);
- increased incidence in floods as a reported shock (due to localized heavy rainfall events).

Figure 7: South Sudan - Incidence of various shocks from mid-2010 to late 2012



Flood as a shock to the household has a pronounced geographical distribution: Unity and Jonglei states stand out with very high reported rates (81 and 59 percent in Oct 2012 respectively) while the incidence for other states remains at roughly the same levels as October 2010.

Of the socio-economic shocks, high food prices are the major issue for households, and are consistently ranked higher than all other shocks across all states throughout the two years of data – the spike in June 2012 resulting from the poor rainfall of 2011 and the disruption of trade flows with Sudan is quite noticeable as is the most recent drop (compared to June 2012 and October 2011) due to the effect of the recent harvest. Geographically, the pattern is as expected – high food prices are reported much more often for the states along the (now closed) border with Sudan, i.e. those which felt the impact of changed trade flows more acutely (North Bahr-el-Ghazal, Warrap, West Bahr-el-Ghazal, Upper Nile).

Noticeable progress seems to have been made in what concerns insecurity and violence, as they dropped markedly in mid-2012 from previous high levels, though still remaining important in Jonglei and Lakes. This reduction is beneficial for agricultural activities and household assets; furthermore, it reduces internal displacement of populations.

5.3 Livelihood profile for South Sudan

Factoring livelihoods is essential to get a clear picture of food security dynamics. From the FSMS database livelihood information can be derived from the reported main source of income. In order to identify key features, income sources are grouped into main livelihoods groups that reflect broad income substrata – agriculture, livestock, paid employment, natural resources. The livelihood categories used are as follows:

- Sale of cereal and other crops.
- Sale of livestock and livestock products.
- Casual labour: includes both agricultural and non-agricultural work with the former contributing about two-thirds.
- Salaried work and skilled labour.
- Sale of natural resources: this includes mostly charcoal making plus firewood and grass collection.
- Sale of alcohol (home brewed products).
- Others: includes aid external to the household (kinship, borrowing), petty trade, sale of fish and sale of food aid – petty trade and sale of fish make up at least half of this component.

Below we present an overview of the main livelihood groups and how they are distributed across the country. Analysis of variations in food security indicators across these livelihood groups is included in the following sections.

5.3.1 Geographical distribution

Overall for South Sudan the two most important livelihoods are Sale of Natural Resources and Sale of Cereal and Other Crops with similar overall predominance in 2010-2012 (just over 20 percent). All other income sources vary between 9 and 14 percent (see table 13).

Table 13: South Sudan - Proportion of households engaged in various livelihoods by state within the period October 2010-October 2012

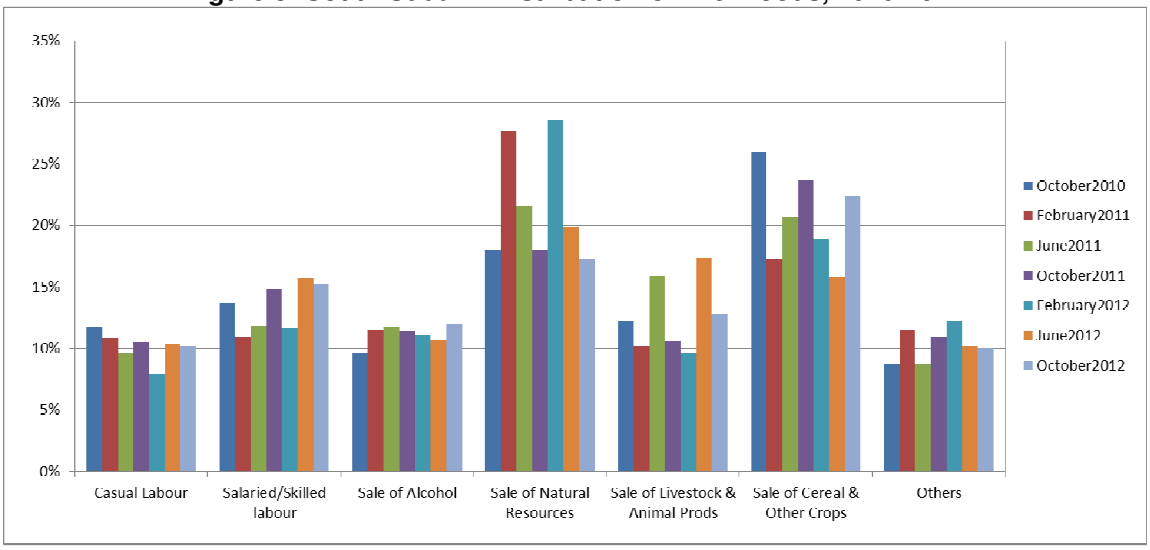
State	Sales of Cereals and other crops (percent)	Sale of Livestock and products (percent)	Casual Labour (percent)	Salaried Work (percent)	Sale of Natural Resources (percent)	Sale of Alcohol (percent)	Others (percent)
CES	**30**	6	18	15	16	8	7
EES	10	19	6	11	**35**	15	3
Jonglei	13	16	6	18	**29**	7	11
Lakes	**33**	25	11	8	7	11	5
NBS	8	7	12	13	**28**	18	13
Unity	13	18	12	8	**31**	8	8
UNS	22	6	9	**28**	15	7	13
Warrap	23	**25**	6	11	10	17	8
WBS	27	2	11	11	**33**	9	7
WES	**34**	4	12	14	16	11	10
South Sudan	**21**	**13**	**10**	**14**	**22**	**11**	**9**

There is geographic differentiation in the livelihood pattern: Sale of natural resources dominates in half of the states (East Equatoria, Jonglei, North and West Bahr-el-Ghazal, Unity) where it is the main income source for about a third of the households. States where livestock based livelihoods dominates are clearly identified as Warrap, Lakes and, to a lesser degree, East Equatoria, Unity and Jonglei. Crop sales dominate in Lakes and in the greenbelt states (Central and West Equatoria, West Bahr el Ghazal). The clear inverse relationship between dependency on natural resources and dependency on agriculture plus livestock, clearly shown in the table, underlines how households engage in the sale of natural resources when other more productive and reliable alternatives are not available or accessible.

5.3.2 Seasonality in livelihood/income sources

Figure 8 shows the overall proportions of each livelihood in the country for each of the FSMS rounds since October 2010. Beyond underlining the ranking of the different livelihood options (natural resources and crop sales as dominant) it shows whether they display a degree of seasonality.

Figure 8: South Sudan - Distribution of livelihoods, 2010-2012



Crop sales peak at around harvest time (October) as expected since it is the period of maximum cereal availability, while sale of natural resources peaks in February once stocks dwindle and other sources of income must be procured (in June household agricultural activities take precedence).

Livestock sales peak in June when households sell/exchange livestock for cereal during the hunger gap. It is worth noting how the poor crop production of 2011 is reflected in the spike in livestock sales in June 2012, as lower than usual stocks and high prices forced households to sell livestock for cereal: TOT for livestock (see Cereal and Livestock Markets in Section 4) shows lowest values in May-June 2012. This is very pronounced for states that were most affected by the poor production levels and where there is an important livestock presence (Unity and Warrap): in Unity, the proportion of households selling livestock as main income shot up from levels below 12 percent up to February 2012 to 47 percent in June 2012 and was still at 21 percent in October which may indicate a significant erosion of household livestock holdings.

5.4 Current food security situation and recent evolution

The household food security status evaluated by the ANLA and FSMS is determined by three components:

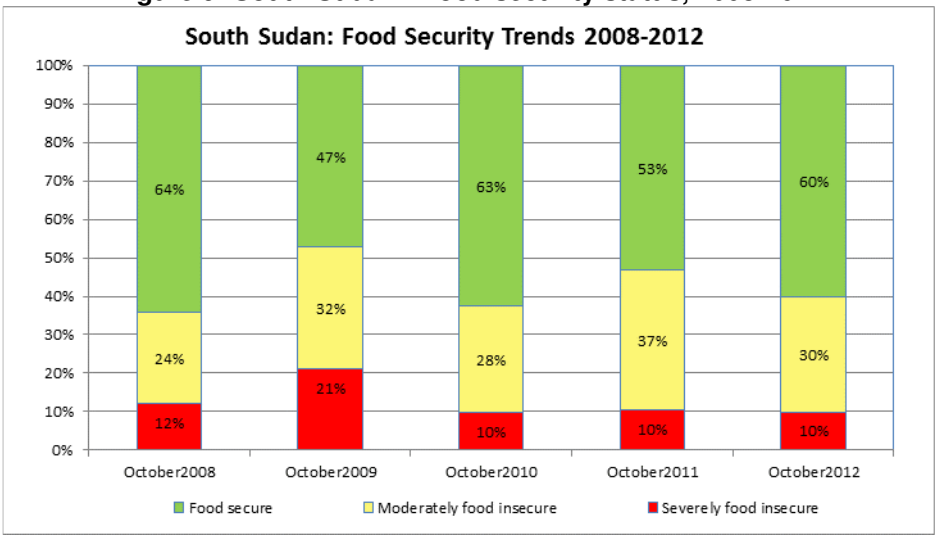
1. Food consumption, based on dietary diversity and frequency;
2. food access, based on the share of food expenditure and the reliability and sustainability of income activities pursued by the household;
3. frequency and severity of different coping strategies employed by households.

Based on these factors, households are classified into three categories: severely food insecure, moderately food insecure and food secure.

5.4.1 Overall food insecurity levels

In October 2012, about 40 percent of the population of South Sudan was moderately to severely food insecure (see Figure 9). This is a decrease from the 47 percent registered in October 2011 that arose from a poor crop production, high food prices and unfavourable market conditions that prevailed that year.

Figure 9: South Sudan - Food security status, 2008-2012

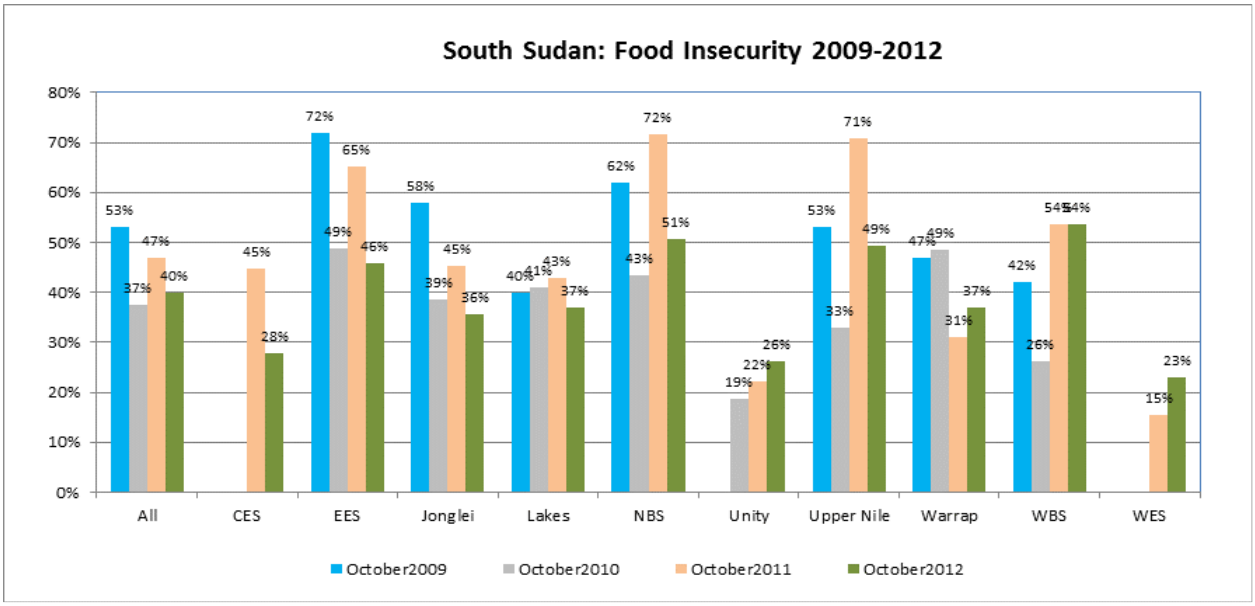


The decrease between 2011 and 2012 is entirely due to a change in the prevalence of moderately food insecure population (to food secure) – the population in the severely food insecure category has remained stable in the last three years at around 10 percent during the post-harvest period, after a peak of 24 percent in 2009. Although the 2012 harvest was about 10 percent above that of 2010 (and 6 percent above the 5 year average), moderately to severely food insecure levels in October 2012 are marginally above those of October 2010.

5.4.2 Seasonal patterns

As expected, food insecurity levels increase from the post-harvest period (October) to the hunger gap (June). In June 2012, the proportion of moderately and severely food insecure households peaked at 53 percent (of which 15 percent severely food insecure), a record within the FSMS duration (since Oct 2010). Hence food insecurity levels are expected to increase in mid-2013 probably by 5 to 6 percent.

Figure 10: South Sudan - State-level prevalence of moderately and severely food insecure, 2009-2012



5.4.3 Geographical – where are the food insecure

There is considerable geographical heterogeneity within this broad picture: at state level, between February and June 2012, extreme levels were reached in the Bahr-el-Ghazals (above 75 percent

moderately and severely food insecure), Warrap (reaching 64 percent), Upper Nile and East Equatoria (above 50 percent).

In October 2012, these proportions still reached fairly high levels: West Bahr-el-Ghazal registers 54 percent (of which 20 percent severely food insecure), North Bahr-el-Ghazal 50 percent (11 percent), Upper Nile 50 percent (6 percent) and East Equatoria 46 percent (16 percent). The most favourable situation can be found in the most productive, least drought prone states of Central and West Equatoria with 28 and 23 percent (of which 1 and 4 percent severely food insecure).

While substantial improvements are noted relative to October 2011 (except for Unity, Warrap, West Bahr-el-Ghazal, West Equatoria), there's little progress compared to October 2010 (see Figure 10), the last season with a normal/favourable growing season, ,with half of the states (West and North Bahr-el-Ghazal, Upper Nile, Unity) showing a worsening food security status.

5.4.4 Livelihoods – who are the food insecure

The highest levels of food insecurity are consistently found among households engaging in Sale of natural resources as a livelihood: severe food insecurity in this livelihood reaches around 18 percent at the post-harvest period and has peaked during the hunger gap at 24 and 28 percent respectively in 2011 and 2012, considerably higher than the overall levels of around 10 percent mentioned above. Lowest levels of food insecurity (7-9 percent) can be found among salaried and skilled workers.

It should be noted that levels of severe food insecurity have only decreased relative to October 2011 among households engaging in agriculture-related activities (sale of crops and casual labour), while all other livelihoods display similar or slightly elevated severe food insecurity levels. Additionally, there has been no improvement relative to October 2010. This underlines the fact that enhanced crop production does not automatically translate into enhanced food security across all livelihoods: what happens on the market side is also of crucial importance. For instance, severe food insecurity among salaried workers used to be marginal (2 percent in October 2010) but increased and has remained at about 8 percent from 2011 onwards, as a result of the rise in consumer prices (see Figure 12 on CPI evolution in Market Performance section).

On the other hand, proportions of food secure households have increased relative to October 2011 across all livelihood groups. This reinforces the notion that there is a core group of households that remains stuck in a food insecure status (amounting to about 10 percent overall, with the above described livelihood variations) with inter seasonal variations in the food security drivers leading to a flow of households between the food secure and moderately food insecure categories.

5.5 Household staple food supply: markets vs. own production

To better understand the interactions between crop production levels (plus their inter-annual variations) and household food security status, it is necessary to assess the importance of markets in the supply of food staples to the households. And its variations across South Sudan, during one season and from season to season.

We focus on the sources of sorghum consumed by households as it is the staple cereal across most of the country. Data for maize/maize flour was also analysed and is quoted where relevant. Other food items have far less variable supply sources – for vegetables, the major source is own production complemented by gathering, cassava is mostly own-produced, while fish, meat and oils and fats are overwhelmingly sourced from markets. Dairy products arise from own production in states where livestock has a significant presence (Unity, Warrap, East Equatoria, Jonglei to a lesser degree).

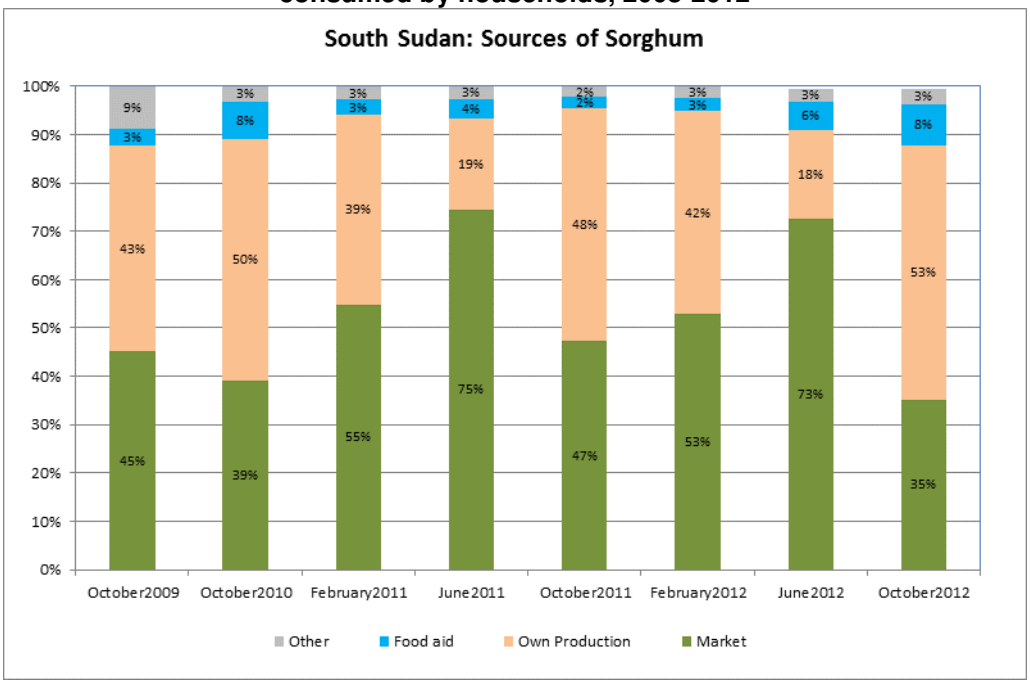
Figure 11 shows the households' main sources of sorghum and their seasonality within the 2009 to 2012 period (the indicator is the proportion of households that report each source as the main sorghum supply). As expected, the two dominant sources of sorghum for households are markets and the household's own production.

Markets are the main source of sorghum for the household, except around harvest time (October) when own production becomes the dominant source, the "switch" being more marked in years of

better crop production levels (2010 and 2012). Conversely, markets exert a pronounced dominance during the lean period (June), being the main source of sorghum for 70 percent of the households.

The supply of maize and pulses shows an overall market dependence which is similar to sorghum in both temporal pattern (post-harvest minimum and peak in mid-June) and magnitude of dependence (maize in particular); for maize, food aid is a significant supply source during the lean season in a number of states (West and North Bahr-el-Ghazal, Jonglei, Warrap, Lakes, East Equatoria), reducing the market exposure of households for this commodity.

Figure 11: South Sudan - Relative importance of different sources of sorghum consumed by households, 2008-2012



The good 2012 harvest had a clear impact, leading to a drop in the predominance of markets as a source of sorghum: in October 2012 it was at levels below those of October 2010. The market predominance will inevitably undergo the typical seasonal increase during 2013 and is expected to reach similarly high levels around the lean season as in previous years.

A relevant fact appears from the table: the levels of overall market dependence in February and June are fairly similar between 2011 (following an average season) and 2012 (following a poor one). This is most likely due to the fact that even in average/good seasons the household stocks mostly do not cover requirements until the following harvest, and hence households must depend on the market to a similar degree, therefore having their food security determined by the interaction of their wealth levels and market price patterns.

Within South Sudan the pattern of market versus own production has some noticeable geographical variations in both the levels of overall market dependence and its seasonality. For sorghum supply, states that deviate markedly from the national aggregate picture include Upper Nile, where market supplies are extremely dominant (constantly above 80 percent since February 2011) and West Bahr-el-Ghazal, where it varies between 57 and 79 percent; North Bahr-el-Ghazal stands out due to an extreme seasonality in market supply – the predominance of market as main sorghum supplier to the household varied from 8 percent this October to 94 percent last June, with other years showing equally sharp variations from post-harvest to lean season. West Equatoria and Central Equatoria are the states where own production is more predominant but even in these states market supply dominates during the hunger gap.

In terms of livelihoods, the same overall seasonal pattern as described above appears across all groups, with variations in the levels of market dependency between the groups: lowest levels of market dependence can be found, as expected, in households engaged in sale of cereal and crop

products, although they still depend on the market for at least 25 percent of sorghum requirements; during the lean season even this group resorts to market supplies to a level close to 50 percent. The highest market dependence is typical of households engaged in salaried work (minimum levels of 50 percent at harvest time increasing to 80 percent in the lean season) and of households engaged in sale of natural resources (minimum of 40 percent at harvest time, peaking at above 80 percent during the lean season). For this particular livelihood group such susceptibility to market price rises is far more serious since they are the group with the worst food security status.

The facts above mentioned underline the key role that markets play in determining the food security of South Sudanese households. The evidence from the FSMS data shows that although good crop production levels are essential, markets are the main suppliers of staples (and other key food items such as meat, oils and fats) for a large part of the season and to a very high degree for specific states, livelihoods and times of the season.

5.6 Market performance in relation to household food security

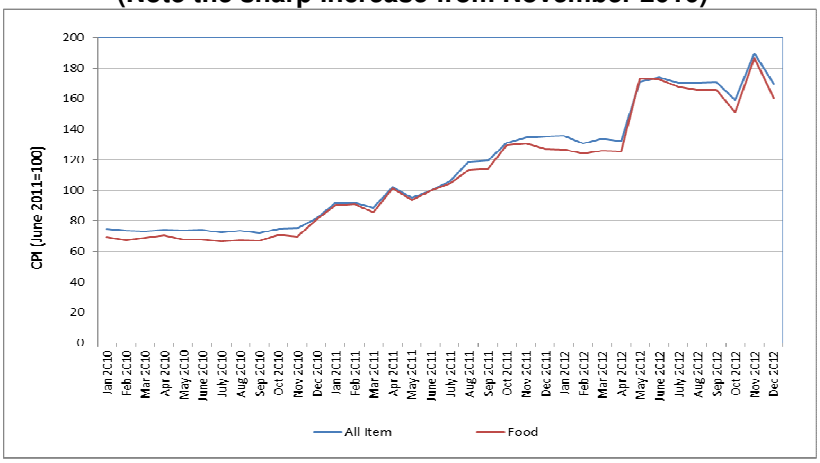
Given that households in South Sudan display a relevant degree of dependence on markets for their food supply, it is important to analyse how market related issues influence food security scenarios for the coming year[14].

In 2012, markets had to operate in a macro-economic environment dominated by the shutdown of oil production, coupled with extremely high inflation rate and currency devaluation (see Section 2). Foreign currency supply became very limited, while the USD reached high prices in the black market.

The inadequate domestic supply in 2012 due to the poor crop production of 2011 was compensated by supply from neighbouring countries (mainly Uganda and Ethiopia), as the normal trade routes with Sudan were disrupted by the border closure. However, expensive fuel, poor road infrastructure, civil insecurity, long distances, complex administrative procedures and multiple-informal taxation, severely constrained the ability of cross border trade channels to supply the domestic markets.

These factors have led to the poor integration of South Sudan's domestic markets. As a result, spatial price differences remain high and prices remain highly volatile (see Section 4.2) in the absence of sufficient commercial flows of cereals between the major urban markets (Juba, Bor, Wau, Aweil, Malakal) (WFP, 2012). The pattern of integration of South Sudan markets with those of neighbouring countries has also changed substantially by becoming progressively disconnected from markets in Sudan (WFP, 2012).

Figure 12: South Sudan - Evolution of CPI since January 2010 (Note the sharp increase from November 2010)



Given the above situation, cereal prices reached very high levels during 2012 and remain higher than one year ago (see section 4.2 for details). Likewise, Terms of Trade for (agro) pastoralists have improved from the lows of mid 2012 but are no better than at the same time last year.

[14] For a full analysis see WFP (2012), *Corporate Market Scoping Mission Report for the Republic of South Sudan*.

The overall picture of price patterns provided by the evolution of the CPI for South Sudan (see Figure 12) shows a sharp rise from December 2010, a period of levelling off and another sudden rise in May 2012. This mid 2012 peak coincides with the period of greater and widespread market dependency for staple cereal supply. After a spike in November, prices returned to the levels of the 3rd quarter of 2012 in December 2012, though according to the Bureau of Statistics, the drop of the CPI food component was mainly due to a decrease in prices of fruit and vegetables, not of staple cereals. Future price patterns may only improve significantly in case the border with Sudan reopens and normal trade flows are resumed.

As pointed out in the previous section, the degree of market dependence in the coming lean season (mid 2013) is most likely to reach the typical high levels of previous years (around 75 percent overall). Hence the way the market environment will evolve and the resulting patterns and trends in food prices will be crucial in determining the food security of South Sudan households through 2013.

The restoration of trade flows with Sudan might be the only factor that could improve these perspectives, assuming that the bumper sorghum crop in Sudan (possibly exceeding 5 million tons) will generate enough surplus for significant exports to South Sudan, given suitable price differentials. This will have a particularly strong impact in the states along the border (Bahr-el-Ghazals, Warrap, Unity and Upper Nile), in particular those with greater market exposure.

5.7 Food expenditure: recent patterns and at-harvest situation

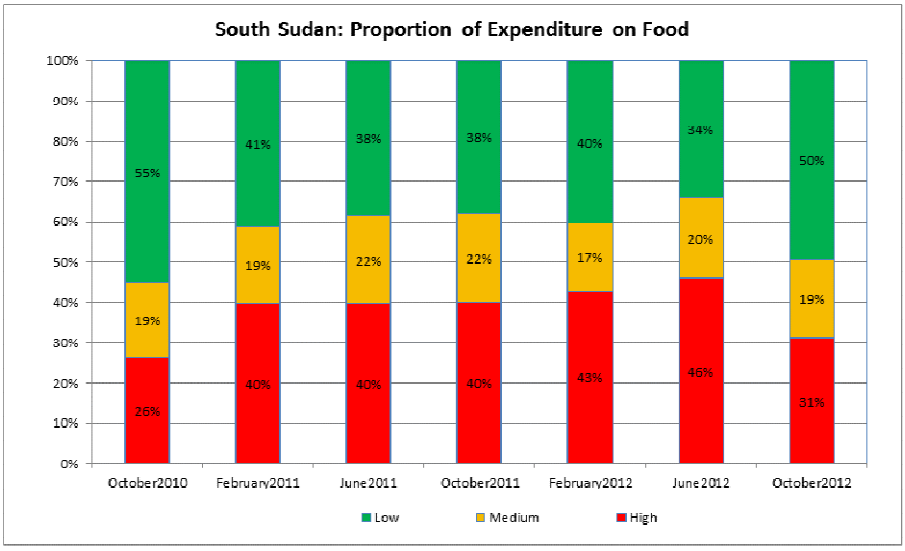
Clearly, because a high proportion of households depend on markets for food, and food prices have reached historical highs, households in South Sudan spend a very large proportion of their incomes on food. Households with high food expenditures are more vulnerable to market price rises as they have a limited capacity to absorb expenditure increases and are therefore more likely to engage in coping strategies with detrimental impacts on their nutritional status and food security.

Based on available FSMS data, households are classified in terms of their expenditure on food:

- High food expenditure: More than 65 percent of expenditure allocated to food.
- Medium food expenditure: Between 50 and 65 percent of expenditure allocated to food.
- Low food expenditure: Less than 50 percent of expenditure allocated to food.

The proportion of households in each class and its variation between late 2010 and late 2012 is shown in Figure 13.

Figure 13: South Sudan - Proportion of households in food expenditure class, October 2010-October 2012



The effects of the poor 2011 crop, coupled with the unfavourable market environment described above, are evident in the record proportions of households with high food expenditure (46 percent overall) that were reached in June 2012. This was particularly the case of the states most affected by the disruption in trade patterns and the poor crop production of the previous season: West Bahr-el-Ghazal (77 percent of households with high food expenditure), North Bahr-el-Ghazal (74 percent), Jonglei (58 percent), Lakes (53 percent), and Warrap (57 percent). In livelihood terms, households engaged in sale of natural resources, casual labour and sale of alcohol registered the highest proportions of high food expenditure (54 to 57 percent in mid-2012); even households engaged in sale of cereal and crop products who are able to rely on self-production for their staple supply to a greater degree, registered proportions of high food expenditure of at least 25 percent around harvest time and a peak of 34 percent during the hunger gap.

The improved 2012 crop production resulted in a drop in food expenditures; 31 per cent (vs. 46 in 2011): These improvements in food expenditure patterns extend across all livelihoods, except for households whose source of income is primarily the sale of cereals (since their patterns show little seasonal change) and salaried Work. The most significant improvement came among households dependent on livestock sales with rates of high food expenditure dropping in October 2012 to 29 percent after being above 40 percent since February 2011.

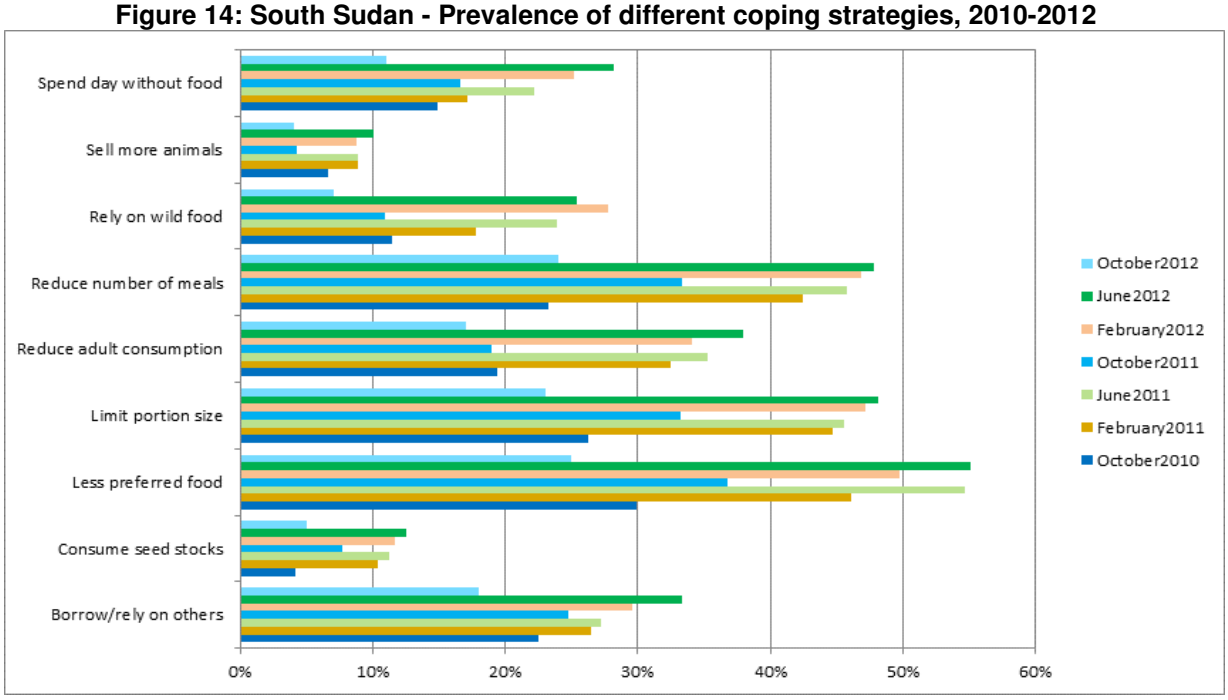
In spite of this substantial improvement over an extreme situation, a higher proportion of households still have food expenditure levels above those of October 2010 (31 vs. 26 percent overall). Due to the high food prices have been recorded in South Sudan since early 2011 gains arising from a more favourable cropping season have been eroded; this is particularly pronounced in places such as Upper Nile, where the proportions of households with high food expenditure levels were 7 percent in October 2010 and currently are at 50 percent.

Clearly, the market environment of the past two years in South Sudan has prevented an improvement in crop production from translating into reduced vulnerability at household level.

5.8 Household coping strategies

In South Sudan the most widely/frequently adopted coping strategies all involve changes in food intake (see Figure 14): eating less preferred foods, eating fewer meals, limiting portion size. The least favoured (and last resort) coping strategies are the sale or consumption of resources such as animals and seed stocks. The degree of adoption of coping strategies is linked to the availability of, and access to, food by the household, as a consequence, the intensity of coping shows a very pronounced seasonal pattern, increasing from a minimum in October to a peak in February/June, as household food stocks decrease and market prices increase.

Figure 14: South Sudan - Prevalence of different coping strategies, 2010-2012



The good 2012 harvest caused a decrease in the frequency of coping strategies compared to October 2011 for all strategies; for many the frequency of use is actually lower now than in October 2010. This is in contrast to other indicators which show little or no improvement, as coping strategies are probably the most sensitive indicator to an increased food supply and therefore the first indicator expected to show improvements in response to the better crop production levels of 2012/13.

In any case, the high overall levels of coping during the lean season do not differ much between 2011 and 2012 in spite of the difference in cereal availability between the two years. As pointed out before, at this time of the season, irrespective of the output of the previous harvest, households have largely exhausted their stocks; therefore they are dependent on markets for their staple food supply and have been suffering the effect of the high food prices that resulted from the unfavourable macro-economic conditions and market environment of the past two years.

Therefore, levels of coping in mid-2013 are not expected to be significantly lower than the levels of the previous two years, unless the market environment improves substantially. Previously, highest levels of coping have been observed in the states of North Bahr-el-Ghazal, Warrap, Unity, Upper Nile and Jonglei (the worst affected by the disruption of trade patterns). Livelihood groups most affected include households dependent on Sale of Livestock, and to a lesser degree, livelihoods tied to Sale of Alcohol and Sale of natural resources. Least affected tend to be Salaried Workers and households engaged in Sale of Cereal.

5.9 Estimated food assistance requirements in 2013

5.9.1 Scenarios

Two scenarios for the calculation of 2013 food aid requirements are developed. They are based on possible market price dynamics (determined by trade patterns and macroeconomic conditions), levels of returnees and IDPs.

Most likely scenario

This scenario assumes a continued disruption of the trade flows from Sudan and the ensuing dependence on supply from other neighbouring countries (mainly Uganda and Ethiopia), leading to the continued upward pressure on food prices; this will affect a population with very high proportion of households having high expenditures on food. Given the results of the FSMS, outlined in previous sections, levels of high food expenditure and food insecurity by mid- 2013 are expected to be similar

to last year's due to persistently high food prices and high market dependency of households during the lean season.

Worst Case scenario

This scenario assumes a worsening of conflict both internal and with Sudan, as well as a continued lack of revenue from oil and an unfavourable macro-economic situation. The assumptions are as follows:

1. Relations between South Sudan and Sudan deteriorate further with direct armed forces confrontations leading to huge influx of refugees and even internal displacements around the borders. Furthermore, the on-going conflicts in South Kordofan and Blue Nile may escalate leading to further displacements and influx of refugees in Upper Nile and other border states.
2. In Jonglei State, the on-going inter-ethnic conflicts in Pibor and other parts could potentially escalate—especially with an increased impact of austerity measures. This would lead to an additional IDP caseload of at least some 200 000 individuals in Jonglei alone.
3. The displacements due to south Sudan-Sudan border conflicts combined with conflict in Jonglei have a potential of increasing the refugee and IDP caseload by nearly 750 000 people.
4. Failure to resume oil production and further tightening of austerity measures would heighten food insecurity as some of the moderately food insecure lapse in severe food insecurity while some currently food secure groups entering into the food insecure category.
5. Due to assumed increased confrontations between Sudan and South Sudan, the border remains closed, reducing the trade between the two countries and sustaining upward pressure on prices.
6. Reduced trade between South Sudan and East African States due to shortage of foreign currency caused by no resumption of oil production and continuing austerity measures. This will lead to reduced food availability especially in Greater Equatoria, Lakes, Bahr El Ghazals and even part of Jonglei. The resulting increases in prices would negatively impact on food security, especially states already in a precarious situation like Eastern Equatoria.
7. The overall impact of points 4-6 would further increase the food insecure resident households by at least 400 000 people, who will need of food assistance.

5.9.2 Food assistance requirements

According to the FSMS results, about 10 percent of the population (1 022 000 people) is severely food insecure while about 30 percent are (3 099 000 people) moderately food insecure. The ANLA 2013 report will include a detailed breakdown of the proportions and numbers of people in each food security class (severely food insecure, moderately food insecure and food secure) for all ten states in South Sudan.

Most likely scenario

In this scenario, planned WFP assistance will cover a total of 2 858 000 unique beneficiaries with total food needs of 224 000 tonnes.

Total beneficiary figures include about 490 000 school-going children under the FFE, about 750 000 socially vulnerable populations including under-five children and mothers under blanket and targeted supplementary feeding programme and institutional feeding to the sick. The refugees and IDPs account for about 800 000, while the rest of the beneficiaries are the food insecure vulnerable resident household members, to be supported through GFD and FFA/CFA activities.

The tonnage requirements are larger than the previous year due to the presence of larger number of refugees and an increase in children's supplementary feeding programmes that offset the decrease in beneficiaries deriving from the improved crop production. The refugee beneficiary planning figures for 2013 stand at 350 000 people covered for 360 days, on its own posing a requirement of close to 70 000 tonnes. The continued assistance to IDPs and returnees amounts to about 36 000 tonnes and over 10 000 tonnes, respectively. Resident beneficiaries will require just over 70 000 tonnes (combined general food distribution and food-for-assets programmes) while school meals, blanket and targeted supplementary feeding and institutional feeding programs will require about 35 000 tonnes.

Table 14: Estimated food assistance requirements, 2013 (unique beneficiaries)

State	Most likely scenario		Worst case scenario	
	Beneficiaries	**Tonnage (tonnes)**	**Beneficiaries**	**Tonnage (tonnes)**
CES	142 000	9 500	153 000	10 200
EES	150 000	9 000	390 000	37 500
Jonglei	445 000	23 800	648 000	39 900
Lakes	207 000	11 500	350 000	26 600
NBS	299 000	14 800	477 000	28 900
Unity	315 000	36 200	482 000	51 500
Upper Nile	489 000	55 700	607 000	68 600
Warrap	505 000	43 200	548 000	49 300
WBS	211 000	13 000	259 000	17 000
WES	95 000	7 000	113 000	9 200
Total	**2 858 000**	**223 700**	**4 027 000**	**338 700**

Worst case scenario

In this scenario, up to 4 million people will require food assistance, mainly due to a significant increase in the number of displaced and refugees that would require support, in addition to some 400 000 residents whose food security situation will deteriorate to the level warranting assistance. This leads to an additional requirement of 115 000 tonnes bringing the total requirement to 339 000 tonnes for an extra 1 169 000 beneficiaries (4 027 000 in total).

Annex I

States and counties visited by CFSAM teams

The Mission visited the following states and counties during the fieldwork conducted between 15 October and 15 November 2012.

Team	States	Counties		Case studies KI interviews
1	Northern Bahr el G	5/5	Aweil Centre, Aweil East, Aweil North, Aweil South, Aweil West.	76
	Western Bahr el G	3/3	Raja, Wau, Jur River.	
2	Warrap	5/6	(Warrap Centre), Gogrial West and East Twic, Tonj North and South.	74
	Lakes	7/8	Cuibet, Rumbek – Centre, East and North, Wulu, Yirol.	
3	Eastern Equatoria	4/8	Torit, Kapoeta, Ikotos, Magwi.	46
	Western Equatoria	4/10	Yambio, Ibba, Maridi, Nzara.	
4	Jonglei	4/11	Bor, Pochalla, Pibor, Boma.	61
	Central Equatoria	3/6	Kajo Keji, Terekeka, Juba.	
5	Unity	6/9	Leer, Mayendit, Koch, Guit, Panjong, Rubkena.	31
	Upper Nile	6/12	Malakal, Panyikang, Anakdiar, Renk, Maban, Mhd el Jack.	

Annex II

Animal traction notes

Animal traction, introduced in earlier in Yei, Lakes and Bahr el Ghazal and Central Equatoria, can make a difference at household level with farm sizes more than doubling. In 2008, it was estimated that some 5 000 ploughs had been distributed in Lakes/Bahr el Ghazal since the programmes began in the middle nineties. (Figures for Kajo Keji and Yei are not included).

Presently, a new wave of interest is being generated by new NGO arrivals and a new generation of staff in the older NGOs. In Ikotos (CRS), Yirol (BYDA), Malualakon (Tearfund), Terekeka (SFM), Mundri (OXFAM, MRDA), Mvolo (NPA), Maridi (RAAH) Kajo-Keji (NPA) small-scale programmes are noted to be re-emerging. However, as new programmes open, so old programmes and interests fold[15]. Information gained from the last two CFSAMs and from interviews in 2008 and from the Missions own observations (2012) identify a number of persistent reasons for the failure of the technique to survive for more than 2-3 years in most areas visited. These are listed below:

- Initial interest is gained by free distribution of ploughs; take-up withers to zero when cash payment or hefty deposits and complete reimbursement in the first year are introduced to make the programmes sustainable. *NB this appears to be changing where requests were received by Mission teams this year (2012) to assist in bringing suitable ploughs to the market at affordable (SSP 500/unit) prices.*
- Ploughs are from various sources including Kenya, Uganda and NPA workshops in Kajo-Keji are noted and locally made donkey ploughs, based on the Darfur model, are being used in Raga, West Bahr el Ghazal.
- The donkey plough development is an example of a *spontaneous transfer of technology* by settlers from Darfur; its emergence in Raga offers the chance of the wider-spread application of a *scuffler*, a surface hoeing tool that could be used for inter-row weeding and thinning as well as ploughing the lighter soils.
- Not all ploughs distributed suit the *in situ* soil conditions and there is enough information available now to match up units and conditions, a task that should be organised by an appropriate organisation in each state.
- Other than NPA, there are still, apparently, no programmes to provide a supply-chain of spare parts so the regularly reported lack of spares such as landslides, bolts, chains, shears and wheels still persists.
- Oxen-training is still, generally, of a poor standard, the pair of oxen after training and regular use appear to require 3-person teams to control their actions and movement, which demands more labour than hhs, can usually provide.
- A few farmers are noted to be interested enough in the technology to share assets (bullocks and ploughs) between hhs. Such a sharing system is well-developed in Ethiopia and could be encouraged in the locations in South Sudan, where self–help groups already exist.
- 2-3 years after training, the oxen, either gifted by NGOs or from farmers' own herds become fat and are attractive saleable commodities in the days of rocketing animal prices. They are sold by the farmers for substantial amounts of cash *e.g. this year SSP-3 000 per head* or more, as butchers' slaughter beasts. Perhaps efforts could be made to introduce an imaginative bullock-exchange process involving cash plus a newly trained oxen is exchanged for a fat slaughter beast.

All of this has been previously reported in the several CFSAMs, however, this year another issue was raised by the EU observer in Warrap:

- As more manpower is required to weed the increased area following bullock ploughing, in good rainfall years such as this one (2012), the financial demand of cash payment (noted at SSP 350 per feddan) or a repeat *nafeer* is often too expensive an input for the farmers to be able to afford. Therefore, full advantage of the extended area is not always enjoyed. As a consequence, planted areas are abandoned to the detriment of household food economy and income generation.

[15] *e.g.* In 2008 the folowing data were gathered by the CFSAM team "Ploughing decline in Mundri CA funded 1999-65 ploughs distributed oxen trained; 2004- 20 pairs left working; 2008 no ploughs left working". NPA inspired programmes are exceptional, in both Kajo-Keji and Yei oxen-ploughing is becoming commercial at SSP 72/feddan (one-day) hire rates. Rates now range from SSP 100/feddan in Kajo- Keji to SSP 350/feddan in Lakes.

- As a corollary to this observation, it is noted that no credit programmes exist to fund weeding for household farmers. Savings and Credit programmes established at county level under earlier programmes either are no longer funded, or, do not provide seasonal funds to farmers, only short-term loans to traders or trader groups.

The Mission feels that unless the preceding constraints are lifted, there is little chance of a rapid expansion of the technology. Previous ideas to improve the situation proposed in earlier CFSAMs have yet to be considered, however, in the new context of *encouraged expansion* it is worth repeating that possible solutions to the practical problems noted above are:

- To lease, **not** give or sell, the correct ploughs for the soil type ploughs to farmers. Ploughs would be distributed to interested farmers at the beginning of the season and collected after each season, repairing the units and re-leasing them the following season if the previous year's rent has been paid. When the farmers have paid for the units in rent, the units are handed over in good condition to the leasing farmers, having, hopefully proved their worth and instilled in the recipients the concept of care.
- New tools should be introduced that can be locally made or mended to extend the activities to a greater variety of operations to include weeding, earthing-up and broadbed-making for vertisols (see Darfur donkey plough; Ethiopian *maresha* and subsequent enhancements).
- In the Greenbelt, where *trypanosomiasis* is found to preclude the effective use of oxen, this lease-sell practice should be extended to the simplest form (Chinese diesel unit) 2-wheeled walking tractor and implements. This tool clearly has widespread application were extended family leasing/ownership will allow cost effective use. This suggestion appears to have been taken up by the FARM project, but details of progress made were not collected by the Mission team.
- Where training programmes have ceased but new NGO interest is apparent, emphasis should be placed on training the farmers to train the oxen, NOT on just training the oxen. By the same token, NGOs embarking on ox-plough introduction programmes should be obliged by GoSS to attend NPA training programmes in the organisation of such programmes to cover; design and planning of the intervention, training of trainers, oxen leasing, credit-support and the establishment of spare-part supply chains and blacksmith training.

Annex III

Seasonal calendar

South Sudan - Indicative cropping calendar

		Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Unimodal rainfall zone	Rainfall	Dry season		Wet season						Dry season			
	Main crop		Land preparation and planting		Growing season			Harvest					
	Long-cycle crops				Growing season					Harvest			
Bimodal rainfall zone	Rainfall	Dry season	Wet season								Dry season		
	First crop	Land preparation and planting		Growing season			Harvest						
	Second & third crops						Land preparation and planting		Growing season		Harvest		

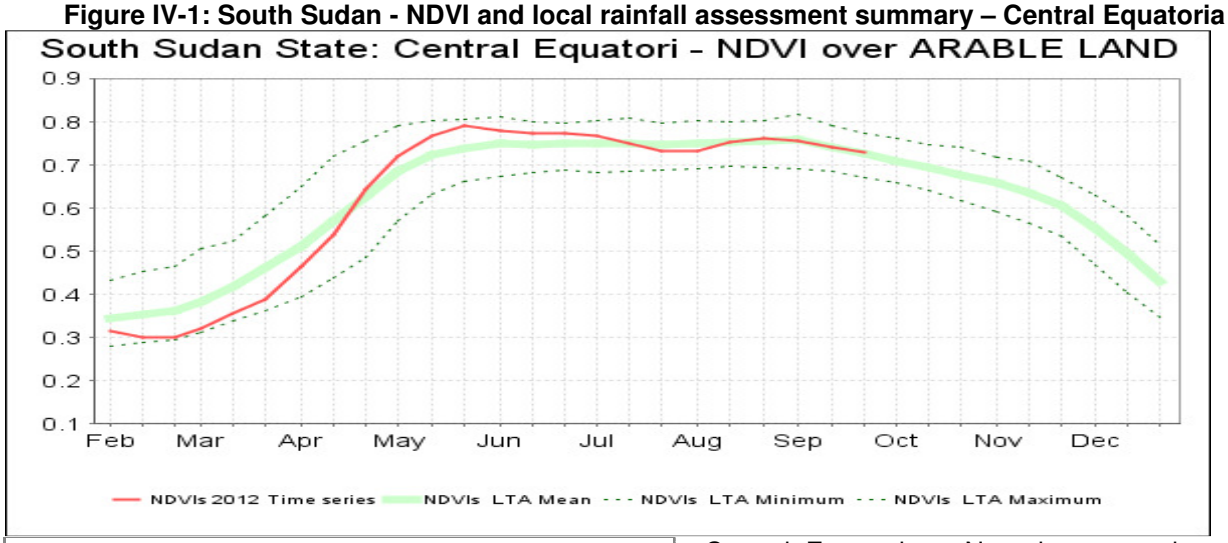
Annex IV

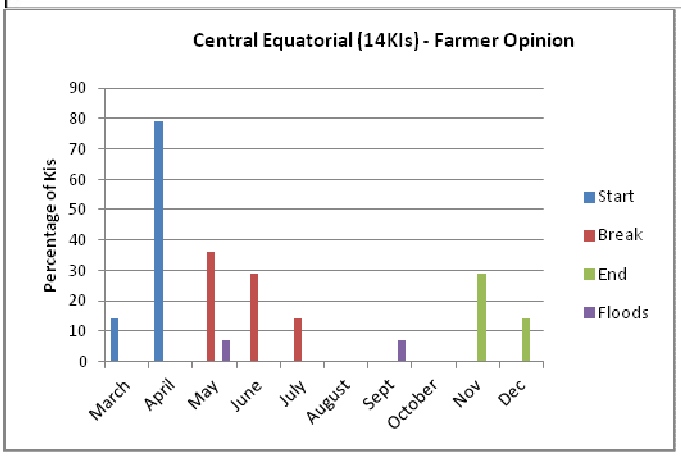
Situation by State

Greater Equatoria:

CENTRAL EQUATORIA STATE

Figure IV-1: South Sudan - NDVI and local rainfall assessment summary – Central Equatoria





Central Equatoria – No rain gauge data available/collected by Mission team.

The rains in Central Equatoria started in March/April with below-average vegetation development noted until the last dekad of April. Thereafter, average or "normal" rains are noted, continuing until the end of November. Breaks in May and June reported by key informants are not captured in the NDVI.

Seed sources are noted to be mostly local/own seeds carried over from the previous harvest. However, maize, in particular, comes from previous allocations/distributions since stabilised in the localities, with *Longi 5* the preferred variety. Mission returns also note the distribution of new maize seeds through programmes designed to support entrepreneurial farmers (IFDC, FARM, and Savannah).

Oxen hiring rates at SSP 300 for one pass/feddan match hire rates noted at SSP 350/feddan for tractor ploughing with secondary cultivation using harrows slightly cheaper at 300 SSP. Digging rates at SSP 3 per 2.2m x 7m result in a hire charge of SSP 729/feddan. Such charges are hard to reconcile in light of the reported low yields of 0.5 tonnes/feddan[16] given current farm-gate prices of SSP 5 per malwa (3.7 kg).

Seed rates for planted crops are as expected with maize at 24 kg/ha. However, local sorghum is noted to be remarkably oversown in the second season, with little attempts at thinning noticed. No significant need to replant was reported in either season.

[16] Mission PET observations and spot checks return much greater yields.

The increase in the amount of horticultural and cash-crop production (sweet potato, groundnut, sesame) noted by last year's Mission, is confirmed by observations this year, especially amongst cooperative farming organizations in the vicinity of Juba. However, most produce in the Juba markets still comes from Uganda.

Weeds, pests and diseases have remained at normal levels this year. Most troublesome pests noted are grass weeds, stalk-borer in maize in the second season, local birds, termites, grasshoppers and rodents. Striga is noted to be of concern to farmers in the over-used areas in Terekeka.

With a slightly increased estimate of area harvested incorporating expansion and conservative estimates of double cropping, gross production is some 40 percent greater than last year's estimates as noted in Table A4.1.

Table A4.1: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

Central Equatoria	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	5 228	0.65	3 398	2 719	134 614	18 174	-15 456
Juba	32 422	0.80	25 938	20 750	425 629	59 589	-38 838
Kajo Keji	35 759	1.10	39 335	31 468	224 490	26 939	4 529
Lainya	10 241	0.71	7 271	5 817	102 078	12 249	-6 433
Morobo	12 550	0.90	11 295	9 036	118 407	14 209	-5 173
Terekeka	25 061	0.95	23 808	19 046	160 458	19 255	-209
Yei	26 598	1.00	26 598	21 278	230 228	28 779	-7 500
Total	**147 859**	**0.93**	**137 643**	**110 114**	**1 395 905**	**179 194**	**-69 080**

Mission attempts to disaggregate cropped area and estimate the contribution from other crops is given in Table A4.2. The contribution of cassava to household food economy is clearly highly significant, estimated at a gross weight 90 000 tonnes of cereal equivalent. Groundnuts at household level will also add an estimated 13 010 tonnes of cereal equivalents (gross dry matter).

Table A4.2: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

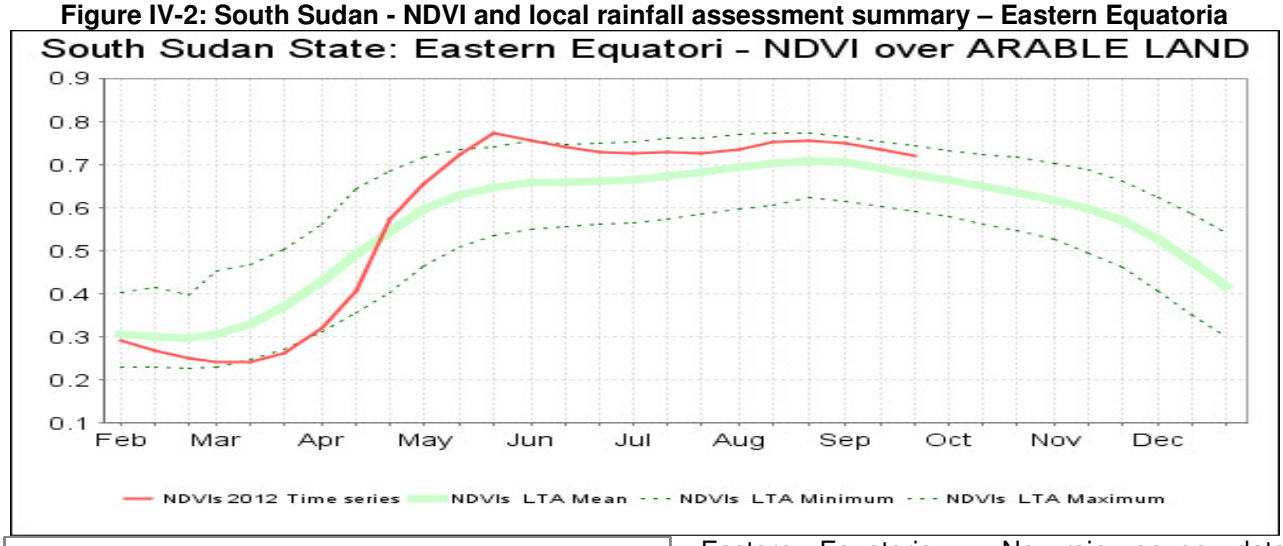
Central Equatoria	Sorghum	Maize	Others	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.67	0.35	0.02	1.04	0.26	0.11	1.41
Gross Production (t)	-	-	-	137 643	21 684[1/]	225 030[2/]	-

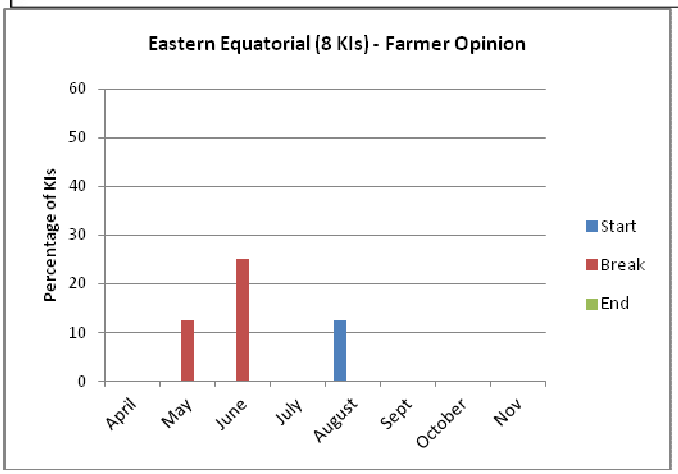
1/ Unshelled.
2/ Fresh weight.

Livestock condition, pastures and water supply are noted to be good, with no reported outbreaks of livestock disease.

EASTERN EQUATORIA STATE

Figure IV-2: South Sudan - NDVI and local rainfall assessment summary – Eastern Equatoria





Eastern Equatoria – No rain gauge data available/collected by Mission team.

The start of the rains was delayed until mid-April, which is noted to have caused some replanting in Kapoeta for early sown crops. Subsequently, the NDVI graph shows much better than average vegetation development due to normal rains for the remainder of the season.

Most farmers either use seed retained from the previous year's harvest or purchased seed from the market. However, some entrepreneurial farmer groups were given improved seed on demand by FARM in a package that provide 25 kg sorghum; 5 kg maize and 10kg groundnuts. Vulnerable families received seed and hand-tools from FAO, Lutheran World Fellowship, NPA and Catholic Relief Services. No problems were reported with seed quality.

Tractor hire is noted at SSP 350/feddan (USD 200/ha), cheaper than hand labour quoted at SSP 20 per 200 sqm (USD 250/ha). Despite these high prices, credit is noted to have been available from micro–finance institutions for petty trading but not for production.

Crop pest and disease levels were mild this year. Principal problems include birds, monkeys, grasshoppers, stalk-borer, termites, aphids, sorghum smut, maize streak and cassava mosaic.

Sorghum, maize and groundnuts all performed well, with cereals showing an average yield of 1.08 t/ha. There was also a slight increase in the area under cultivation this year, attributable both to improved security and to increased government support. High-production areas grow more maize, which is planted as a first-season crop in March, with a second crop following immediately after harvest; low-production areas tend to concentrate on sorghum, which is broadcast later in July, or, in the favourable areas, following a groundnut crop. Production estimates are given in Table A4.3.

Table A4.3: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

Eastern Equatoria	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	1 511	0.75	1 133	907	24 253	3 032	-2 126
Budi	14 238	0.90	12 814	10 251	113 375	13 605	-3 354
Ikotos	18 149	1.10	19 964	15 971	96 745	12 093	3 878
Kapoeta East	16 334	1.20	19 601	15 681	187 431	23 429	-7 748
Kapoeta North	8 862	1.20	10 635	8 508	117 814	14 727	-6 219
Kapoeta South	6 574	1.20	7 889	6 311	90 826	11 807	-5 496
Lafon	14 598	0.90	13 138	10 511	121 332	14 560	-4 049
Magwi	31 486	1.00	31 486	25 189	194 094	23 291	1 898
Torit	18 695	1.30	24 304	19 443	113 993	14 819	4 624
Total	**130 447**	**1.08**	**140 963**	**112 771**	**1 059 862**	**131 364**	**-18 594**

Mission attempts to disaggregate cropped area and estimate the contribution from other crops is given in Table A4.4. The contribution of cassava to household food economy is clearly highly significant at a gross weight of 67 500 tonnes of cereal equivalent. Groundnuts at household level will also add an estimated 8 002 tonnes of cereal equivalents (gross dry matter).

Table A4.4: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

Eastern Equatoria	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.64	0.26	0.11	1.01	0.17	0.11	1.29
Gross Production (t)	-	-	-	140 963	13 338[1/]	168 864[2/]	-

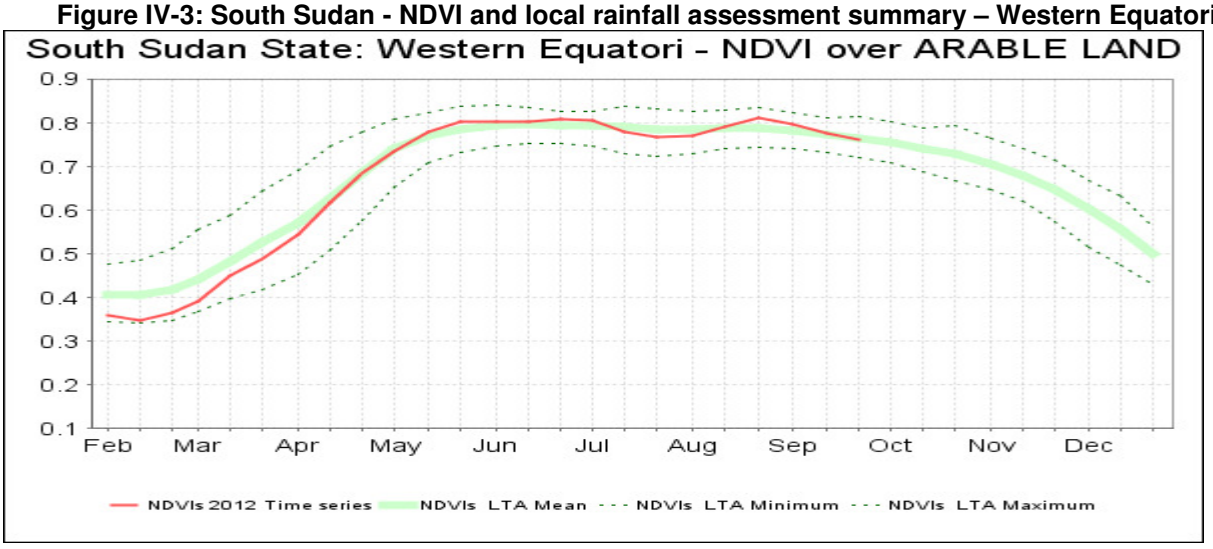
1/ Unshelled.
2/ Fresh weight.

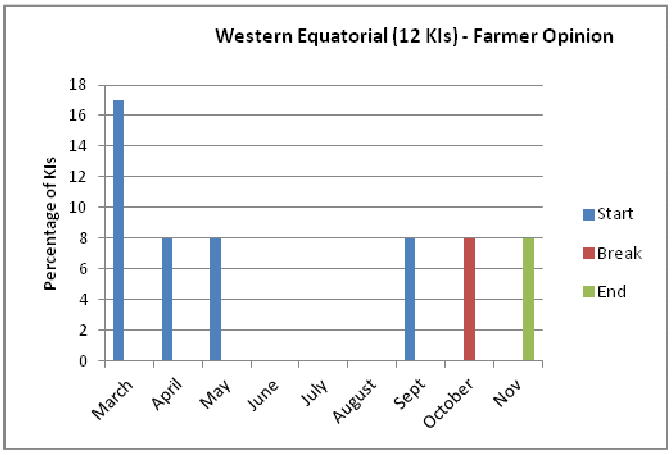
Livestock condition is very good and, numbers are expected to rise, despite reported high neo-natal mortality rates. However, no significant outbreaks of animal diseases are noted.

With the good late rains, pasture and water availability for the coming dry season are considered to be satisfactory and increased livestock prices reflect this. Prices of grains at farm gate are falling being now 30 percent of current market.

WESTERN EQUATORIA STATE

Figure IV-3: South Sudan - NDVI and local rainfall assessment summary – Western Equatoria





Western Equatoria – No rain gauge data available/collected by Mission team

The rains in Western Equatoria are noted by farmers to have started from March to May depending on location, with the NDVI showing a slow development of vegetation that was normal by the last dekad in April and has remained so until the Mission left in November.

Farmers planted their first-season crops at the normal time in March-April, following a February harvest. These included groundnuts, maize, millet and sesame, the harvest of which starts July-August. The second season begins at the end of the first season in July with planting continuing to September (three crops can be grown in quick succession), but most farmers planted their second-season crops of maize and sorghum in September, these will be harvested from December onwards. Cassava is also planted from April to September. Other significant cash crops grown include pineapple, banana, sweet potato, yam, pumpkin and sesame.

This year, farmers used either their own cereal seed saved from the previous year's harvest or seed purchased from the market. FARM, CRS and GIZ distributed improved seed to entrepreneurial farmer groups. Private tractor hiring rates increased to SSP 450 for two passes/feddan (USD 270/ha) compared to hand labour digging at SSP 200-350 per feddan. As noted last year, notwithstanding the potential of this area, fuel and spare parts are usually in short supply, there is a shortage of trained operators, and credit for production is unavailable.

Levels of weeds and crop pests and diseases have been normal this year.

The performance of both cropping seasons has been generally good. Estimates of cereal area and production by county are included in Table A4.5 recording a surplus at state level of 51 000 tonnes. Farm-gate prices are SSP 4 per 3.7 kg maize are lower than last year.

Table A4.5: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

Western Equatoria	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	1 070	1.15	1 231	985	23 008	3 336	-2 352
Ezo	25 105	1.3	32 636	26 109	92 495	13 412	12 697
Ibba	14 291	1.2	17 149	13 720	47 893	6 944	6 775
Maridi	17 340	1.2	20 808	16 646	94 325	13 677	2 969
Mundri East	7 631	1	7 631	6 105	55 269	8 014	-1 909
Mundri West	4 937	1	4 937	3 949	38 863	5 635	-1 686
Mvolo	8 042	1.25	10 052	8 042	55 059	7 984	58
Nagero	2 957	1.1	3 252	2 602	11 527	1 671	930
Nzara	22 582	1.3	29 356	23 485	75 166	10 899	12 586
Tambura	18 633	1.3	24 223	19 378	63 331	9 183	10 195
Yambio	34 970	1.3	45 461	36 369	174 163	25 254	11 115
Total	**157 557**	**1.25**	**196 737**	**157 389**	**731 098**	**106 009**	**51 380**

Cereal cropped area has been increased by an average of 20 percent per household to accommodate *conservatively* widespread second cropping. This estimate should be addressed again when the number of households actually farming are known more accurately. This year, a Mission attempt to estimate areas of two other major crops is included in Table A4.6.

Table A4.6: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

Western Equatoria	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.43	0.9	0.04	1.37	0.3	0.3	1.97
Gross Production (t)	-	-	-	196 737	20 446[1/]	696 078[2/]	-

1/ Unshelled.
2/ Fresh weight.

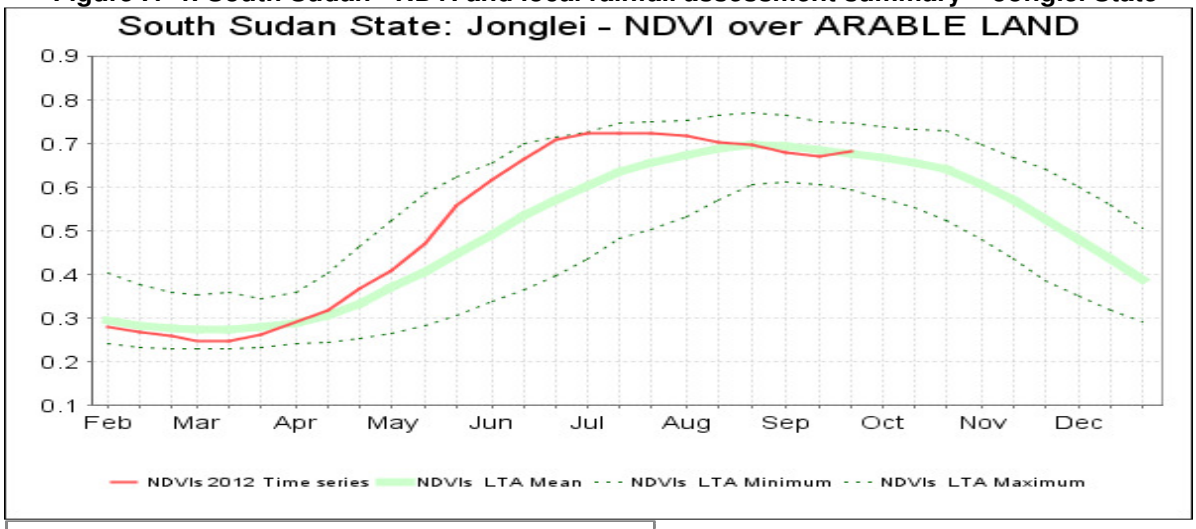
In particular, the table shows clearly the extreme importance of cassava that is estimated to add a potential gross weight of 278 000 tonnes of cereal equivalent to the production of the state, if all 2nd year cassava is dug and not left for a third year (rotting and abandoned fields follow) in the field. Groundnuts at household level will also add an estimated 12 262 tonnes of cereal equivalents (gross dry matter),

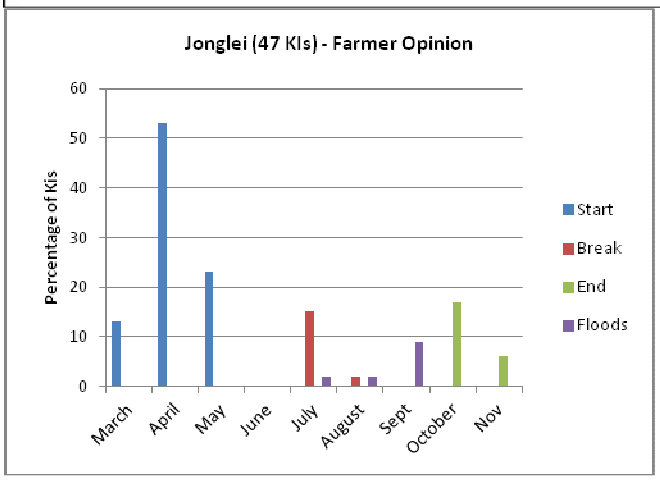
Livestock condition of goats the predominant species is generally very good, with browse, pasture and water noted to be plentiful. Livestock numbers are stable with no reported outbreaks of animal diseases, all conditions reflected in the firm market prices.

Greater Upper Nile:

JONGLEI STATE

Figure IV-4: South Sudan - NDVI and local rainfall assessment summary – Jonglei State





Jonglei – No rain gauge data available/collected by Mission team.

The rains this year began on time continued to October-November with few, if any, significant breaks. The is in all respects better than last year, but caused flooding and water logging, displacing some 30 000 households with concomitant effects on area farmed, which has not increased. Dry spells in July are confirmed by a decline in vegetation from above average to average in August. Rainfall during September caused flooding in some localities, but has been generally well distributed in October and November supporting the late-planted, ratooning and second-season crops, especially in those areas bordering Ethiopia such as Pochalla.

Insecurity incidents at the time of planting caused farmers to be cautious, preferring to cultivate only near their homesteads. Limited labour availability and financial constraints were also cited as factors contributing to the reduction in cultivated area, especially in those parts of the state where farmers fence off their crops for protection against the intrusion of livestock.

Sorghum is the predominant cereal crop in most of Jonglei State except in Pochalla County where substantial amounts of maize are grown as a first-season crop that are followed, in August-September by short-season sorghum.

Throughout the state, land preparation is mostly by hand planting; no prices for tractor hire were reported to the Mission team. Seeds and planting material are local. With the exception of some distribution of seeds to vulnerable families, inputs, other than animal dung supplied by livestock grazing over farmers' fields on request/payment, are non-existent. Fortunately, this year, the level of crop pests - mainly birds, rats and stalk-borers, has not been considered as serious.

Production estimates are included in Table A4.7.

Table A4.7: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

Jonglei	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	6 710	0.45	3 020	2 461	106 327	11 696	-9 280
Akobo	10 456	0.70	7 319	5 855	155 674	17 125	-11 269
Ayod	9 181	0.65	5 968	4 774	159 185	16 714	-11 940
Bor South	15 586	0.70	10 910	8 728	252 701	29 060	-20 332
Duk	5 012	0.50	2 506	2 005	74 960	7 871	-5 866
Fangak	10 187	0.60	6 112	4 890	125 867	13 216	-8 327
Khorflus/Pigi/Cnl	8 363	0.60	5 018	4 014	113 225	11 889	-7 875
Nyirol	9 014	0.60	5 408	4 327	124 203	13 663	-9 336
Pibor	4 239	1.00	4 239	3 391	169 692	17 817	-14 426
Pochalla	5 760	1.20	6 912	5 530	75 661	7 566	-2 036
Twic East	7 258	0.60	4 355	3 484	97 545	10 730	-7 246
Uror	15 857	0.60	9 514	7 611	204 029	20 403	-12 792
Total	**107 623**	**0.66**	**71 281**	**57 070**	**1 659 070**	**177 751**	**-120 726**

This year, a Mission attempt to estimate areas of two other major crops is included in Table A4.8.

Table A4.8:South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

Jonglei	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.44	0.24	0	0.68	0.1	0	0.78
Gross Production (t)	-	-	-	71 281	7 407[1/]		-

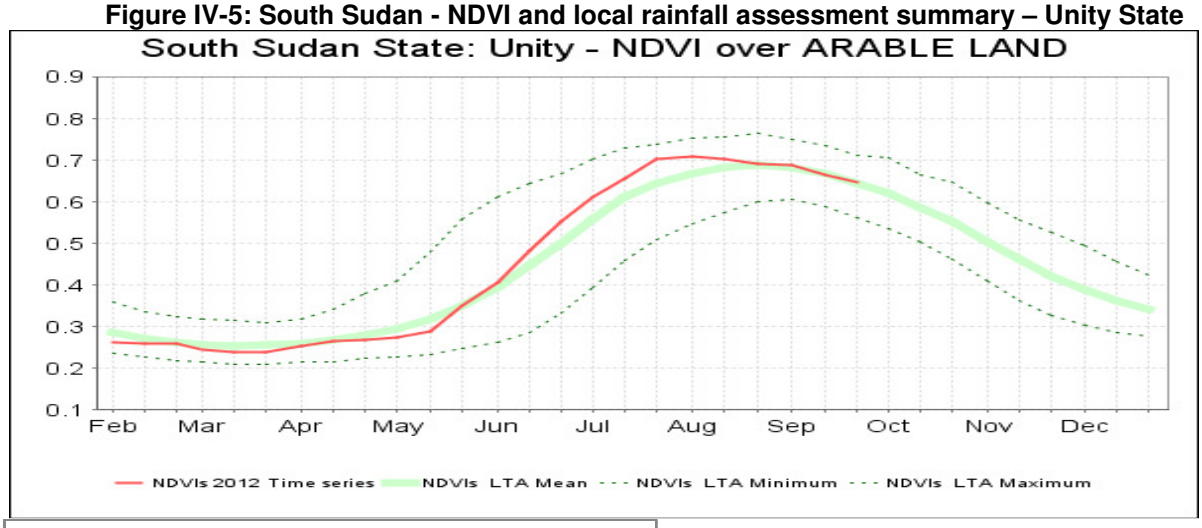
1/ Unshelled.

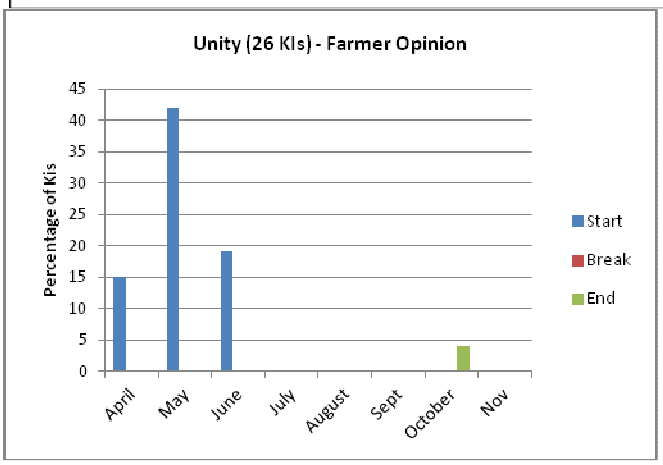
With no significant areas of cassava noted, the major contribution at state level is groundnuts providing a further gross dry matter weight of 4 444 tonnes cereal equivalents.

Fish and livestock products provide significant contributions to the household food economies. Fishing is being conducted as normal and livestock condition is generally good (PET Body Condition 4-predominant score). There are adequate pasture and water reserves for the coming dry season. However, continuing cattle raiding and inter-communal conflict have led to the movement of cattle closer to urban centres for security, and this has caused heavy grazing and a general deterioration of pasture quality in those areas. Veterinary services such as vaccination programmes are disrupted by access and the closure of the border with Sudan is restricting access to other livestock medicaments.

UNITY STATE

Figure IV-5: South Sudan - NDVI and local rainfall assessment summary – Unity State





Unity State – No rain gauge data available/collected by Mission team.

In Unity State rains started early in April with an even average growth of vegetation noted until October. SMOA statements of dry spells, which apparently caused replanting of crops, are not noted in Mission team case-studies. Flooding and water-logging that are common occurrences in the state are reported to be more extended that normal, causing displacement of households and a loss of farmed area of 4 500 ha.

The incidence of weeds, pests and diseases was reported to be normal with the usual problems of weeds, birds, rodents and striga in exhausted fields. In previous years, migratory quelea birds have been controlled by aerial spraying of nesting sites, carried out by the Khartoum authorities; this year, however, with independence from Sudan, no spraying was carried out, and increased grain losses to birds are expected in areas where there are still un-harvested, late-planted sorghum crops. As noted last year, in Koch, Guit and Rubkona counties, many farmers have changed their cropping pattern from sorghum to maize in order to avoid losses to birds.

Reports that weeding has been conducted 3 to 4 times this year, in all counties, suggest that crop performance, although reduced from the full potential, is very much better than last year across the state. Production estimates are included in Table A4.9**.**

Table A4.9: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

Unity	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	9 618	0.4	3 847	3 078	203 224	18 291	-15 213
Abiemnhom	802	0.4	321	257	19 443	1 652	-1 396
Guit	1 721	0.4	688	551	37 721	3 206	-2 655
Koch	3 575	0.4	1 430	1 144	85 561	7 273	-6 129
Leer	2 814	0.4	1 125	900	60 598	5 151	-4 251
Mayendit	3 153	0.4	1 261	1 009	61 469	5 225	-4 216
Mayom	8 510	0.4	3 404	2 723	137 965	11 727	-9 004
Panyijar	3 899	0.4	1 559	1 248	57 971	4 928	-3 680
Pariang	5 119	0.4	2 048	1 638	94 224	8 009	-6 371
Rubkona	2 882	0.4	1 153	922	114 559	10 883	-9 961
Total	**42 092**	**0.40**	**16 837**	**13 469**	**872 734**	**76 345**	**-62 876**

The mechanized rainfed sector suffered from shortages/high price of fuel and spare parts since border closure cut most of the supply chains; nevertheless some 900 ha are estimated to have been harvested producing 871 tonnes of mixed cereals.

This year, a Mission attempt to estimate areas of two other major crops is included in Table A4.10.

Table A4.10: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

Unity	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.36	0.16	0	0.52	0.05	0	0.57
Gross Production (t)	-	-	-	17 708[1/]	1 344	-	-

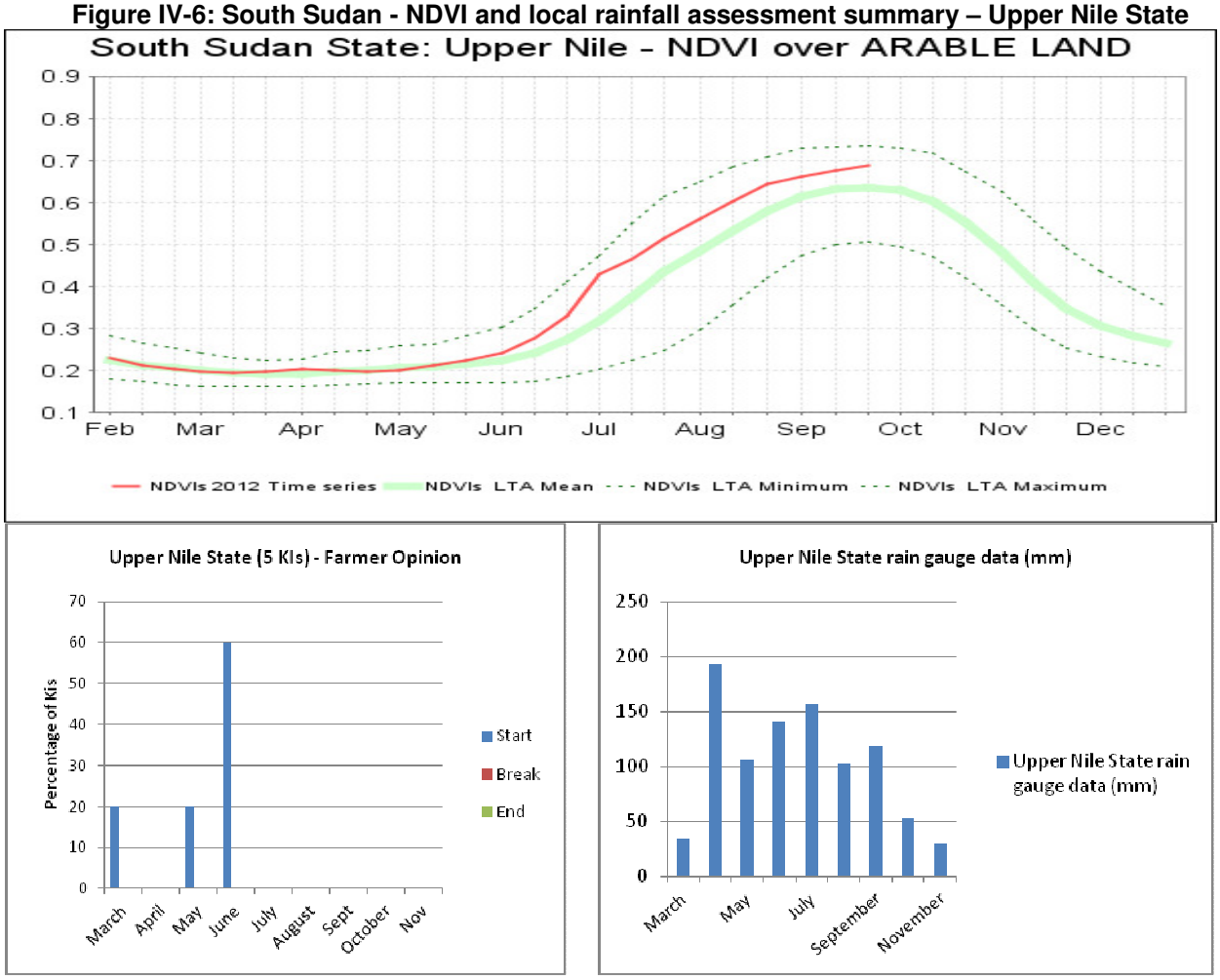
1/ Includes mechanized crop.

With no noted cassava, and very small area of groundnuts grown, other crops are only expected to contribute 806 tonnes cereal equivalents to the Unity State cereal balance sheet.

Regarding livestock, body condition is generally good, and pasture and water availability are adequate. Incidents of all endemic diseases are noted but no major outbreaks are reported. Despite border closure, livestock prices are firm; livestock numbers are not likely to have increased this year.

UPPER NILE STATE

Figure IV-6: South Sudan - NDVI and local rainfall assessment summary – Upper Nile State



In Upper Nile State, the start of the main rains in April was followed by well-distributed rains throughout the season until November, resulting in better than average vegetation.

Two distinct sub-sectors make up agricultural production in Upper Nile State, a) mechanized rainfed farming that encompasses some 300 000 ha in the clay plains involving very large-scale, tractorized shifting cultivation of tens of thousands of feddan; and, smaller, more stable traditional, under-marked farming of tractorized units of some 50-500 feddan; and, b) smallholder hand-dug plots conforming to the farming system practised throughout the country.

This year, well-distributed rains have encouraged the expansion and performance in both sub-sectors.

Despite the continuing problems associated with access to fuels and spare parts, some 230 000 ha of field crops (220 000 ha cereals and 10 000 ha sesame) are expected to be harvested this year in Upper Nile State. As most seeds used are locally-sourced feterita, sorghum varieties of *Wad Ahmed, Afagadamak* and G*adam el hamam* seeds and sowing rates are usually minimal at 7 kg/ha compared to the hand-dug any claims of seed shortages are hard to reconcile with the usual practice. The Agricultural Bank of South Sudan provided loans to 40 entrepreneurs, provided fuel and added another 18 tractors to the 100 noted last year. With a work rate of 20 ha disc-harrowed by day the tractor force should have completed the cultivation of c. 200 000 ha in 100 days (May/June-August).

The incidence of crop pests and diseases has been normal this year, with rodents, termites and grasshoppers noted as the main offenders. Quelea birds previously controlled by Khartoum authorities remain a threat to the late sown and late maturing (*agono*) sorghum farms.

The expected performance of the smallholder sector is described in Table A4.11.

Table A4.11: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

Upper Nile	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	2 547	0.21	535	428	58 300	4 959	-4 531
Baliet	3 817	0.6	2 290	1 832	54 871	4 390	-2 558
Fashoda	4 711	0.6	2 827	2 261	41 736	3 339	-1 077
Longochuk	3 674	0.6	2 204	1 764	72 192	5 776	-4 012
Luakpiny/Nasir	15 423	0.6	9 254	7 403	240 011	19 201	-11 798
Maban	4 362	0.6	2 617	2 094	51 702	4 136	-2 042
Maiwut	4 650	0.6	2 790	2 232	90 817	7 265	-5 033
Malakal	4 217	0.6	2 530	2 024	144 557	13 732	-11 708
Manyo	4 466	0.6	2 680	2 144	43 442	3 476	-1 332
Melut	5 095	0.6	3 057	2 446	56 279	4 503	-2 057
Panyikang	2 016	0.6	1 210	968	51 919	4 153	-3 186
Renk	18 967	0.6	11 380	9 104	157 435	14 169	-5 065
Ulang	6 136	0.6	3 682	2 945	97 197	7 776	-4 830
Total	**80 083**	**0.59**	**47 057**	**37 645**	**1 160 458**	**96 875**	**-59 230**

The mechanized sector is expected to contribute 108 000 tonnes of cereals and 2 600 tonnes of sesame.

The contribution of other staples in the smallholder sub-sector to the household food economies are not expected as shown in Table A4.12.

Table A4.12: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

Upper Nile	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.49	0.23	0	0.72	0	0	0.72
Gross Production[1/] (t)	-	-	-	153 000[1/]	-	-	-

1/ Includes mechanized crop.

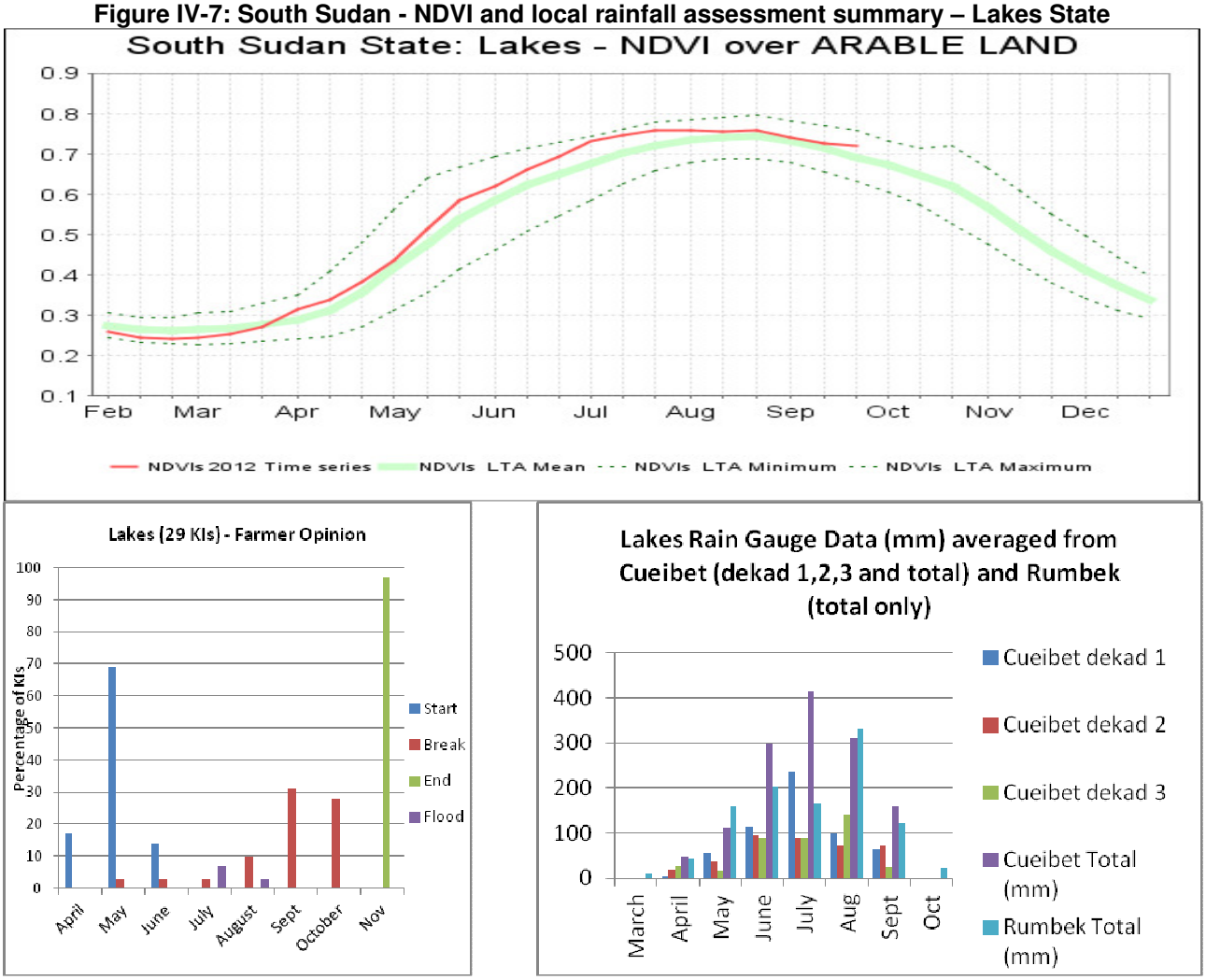
Despite the expected harvest from the mechanized sector, prices of grain in the retail markets remain 5 to 6 times higher than in other states, indicating that traders do not expect the mechanized harvest to reach markets in South Sudan (being diverted to Sudan).

Livestock condition is generally good although a number of incidents of disease are noted in small ruminants, including PPR (major) and CCPP. However, no cattle outbreaks are reported. Vaccinations against HS, CBPP, CCPP and PPR were carried out. The prospects for pasture and water for livestock during the coming dry season are good due to adequate late rains. Prices of animals are firm or increasing. Livestock numbers are not expected to increase as sales match increases.

Greater Bahr el Ghazal

LAKES STATE

Figure IV-7: South Sudan - NDVI and local rainfall assessment summary – Lakes State



The 2012 rainfall season in Lakes was characterized by a slow arrival of the first rains that did not become fully established until May, but were well distributed for the rest of the season exhibiting short breaks only. The NDVI graph shows average or greater than average performance of vegetation throughout the season from early April until Mission departure in November. Intense rainfall in July is noted to have caused flooding in some low-lying locations.

Area planted is noted to have increased significantly due to encouraging rain, expansion of use of animal traction with ox plough contracting becoming common place at SSP 100-150 per feddan; availability of local seeds (own and market purchased) for the main crop *(nyandoc*) grown alone and in association with bulrush millet; and, late maturing *(kec)* sorghums, that have all benefitted greatly from the late rains; and very few cases of replanting. With regard to ox-ploughs, their appearance in local markets is being welcomed by farmers who are paying a reported SSP 800-1200 per unit against the GOSS subsidised price of SSP 500.

As with most states in the northern regions, there is no use of fertilisers or plant protection chemicals; but unlike some of the other neighbouring states there is little, if any, use of animal dung on cereals. The need for weeding is said to be less due a) to the non-use of pastoralist livestock to graze over farmland; and b) by heavy sowing rates used. Only mild infestations of pests and diseases were noted.

Table A4.13 summarises the estimated cereal production, a substantial proportion of which will come from the late maturing *kec* to be harvested from December onwards. The data suggest surpluses in two counties.

Table A4.13: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

Upper Nile	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	5 007	0.5	2 504	2 003	83 864	8 387	-6 384
Awerial	2 353	0.81	1 906	1 525	53 763	5 376	-3 851
Cueibet	18 027	0.8	14 422	11 537	134 582	13 458	-1 921
Rumbek Centre	13 435	0.8	10 748	8 599	175 492	19 305	-10 706
Rumbek East	15 148	1.04	15 754	12 603	140 385	14 039	-1 435
Rumbek North	4 836	0.8	3 869	3 095	49 613	4 961	-1 866
Wulu	6 869	0.95	6 526	5 221	46 344	4 634	587
Yirol East	8 960	1.08	9 677	7 741	77 033	8 474	-733
Yirol West	16 243	1.08	17 542	14 034	117 935	12 973	1 060
Total	**90 880**	**0.91**	**82 948**	**66 358**	**879 012**	**91 607**	**-25 249**

Contribution from other crops is noted in Table A4.14. The ecology of Lakes State does support the growth of 2-year cassava as well as groundnuts.

Table A4.14: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

Lakes	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	5 083	10	50 830	16 481	0.5	8 241	5 083
Gross Production (t)	-	-	-	82 948	8 241	50 830	-

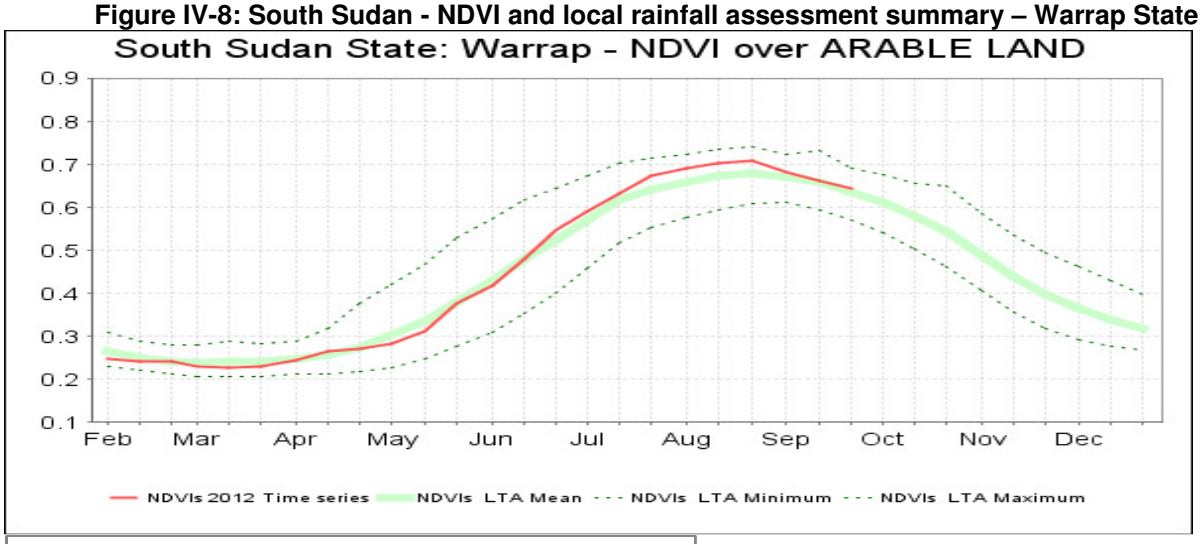
Cassava is estimated to add (gross) 20 332 tonnes of cereal equivalents and groundnuts a further 4 944 tonnes of cereal equivalents to the far better harvest reported this year.

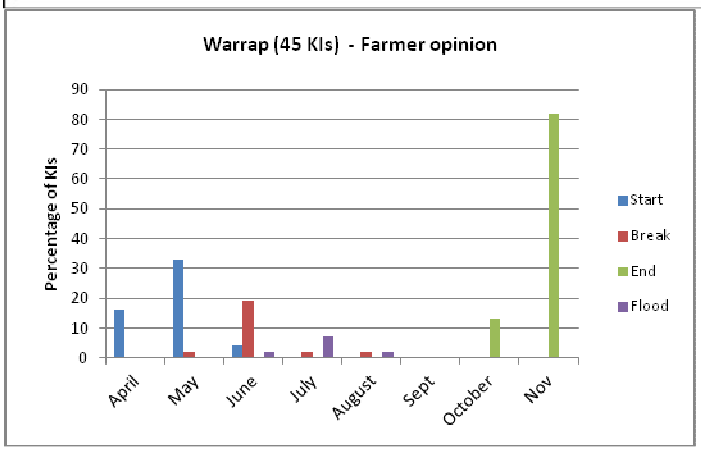
Grain prices have fallen, and the larger-scale farmer groups are looking for buyers for small surpluses.

Livestock condition is fair and the outlook for pasture and water is variable depending on access, which may be constrained by water logging; however, livestock prices are noted to be as high as elsewhere in the country.

WARRAP STATE

Figure IV-8: South Sudan - NDVI and local rainfall assessment summary – Warrap State





Warrap State – No rain gauge data available/ collected by Mission team.

The 2012 rainfall season in Warrap is characterized by a timely start, no prolonged dry spells supporting average vegetation development until November. Some localised flooding in July is reported.

The dominant crop is sorghum comprising short-cycle (3 months) sown for an early food crop in late August/September with maize; and medium-cycle (4-5 months) main crop, sown with a little bulrush millet. Intercropping with groundnut, sesame, cowpeas occurs in the main body of the fields; and okra and pumpkin are grown with the *cham* (early sorghum) around the homestead.

Land preparation is carried out manually by family labour for all but the rich landowners who will fund a series of *nafeer* (food and drink) work parties. Some ox ploughs are being sold under GOSS cost–recovery programmes at c. SSP 680 per unit. Given tractor ploughing rates of SSP 400 per feddan, this may be seen as an acceptable price but the bullocks must be found and trained.

Apart from seeds distributed to returnees and vulnerable households, local seeds, own grown or market purchased, are used at high sowing rates reflecting the broadcasting method used as well as the perceived need to over sow to smother weeds.

No serious levels of pests and diseases have been noted or reported this year.

Harvest Table A4.15 summarises the estimated cereal production, a substantial proportion of which will come from the later maturing landrace from December onwards. The data suggest production at almost break-even point (supply-demand) in the performance of two counties.

Table A4.15: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

Warrap	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	3 242	0.45	1 459	1 167	80 461	8 048	-6 881
Abyei	2 631	0.68	1 789	1 431	60 491	5 444	-4 013
Gogrial East	16 247	0.75	12 185	9 748	118 143	11 224	-1 476
Gogrial West	38 970	0.77	30 007	24 005	279 014	29 297	-5 292
Tonj East	20 838	0.45	9 377	7 502	132 828	13 283	-5 781
Tonj North	30 333	0.65	19 716	15 773	188 993	18 899	-3 126
Tonj South	15 341	0.68	10 432	8 345	99 050	8 914	-569
Twic	36 002	0.72	25 921	20 737	234 385	21 095	-358
Total	**163 603**	**0.68**	**110 886**	**88 709**	**1 193 365**	**116 203**	**-27 494**

Contribution from other crops is noted in Table A4.16. The ecology of Warrap State does not support the widespread growth of cassava, which is found only around the edges of fields and pathways. Groundnuts, however, make a more substantial contribution.

Table A4.16: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

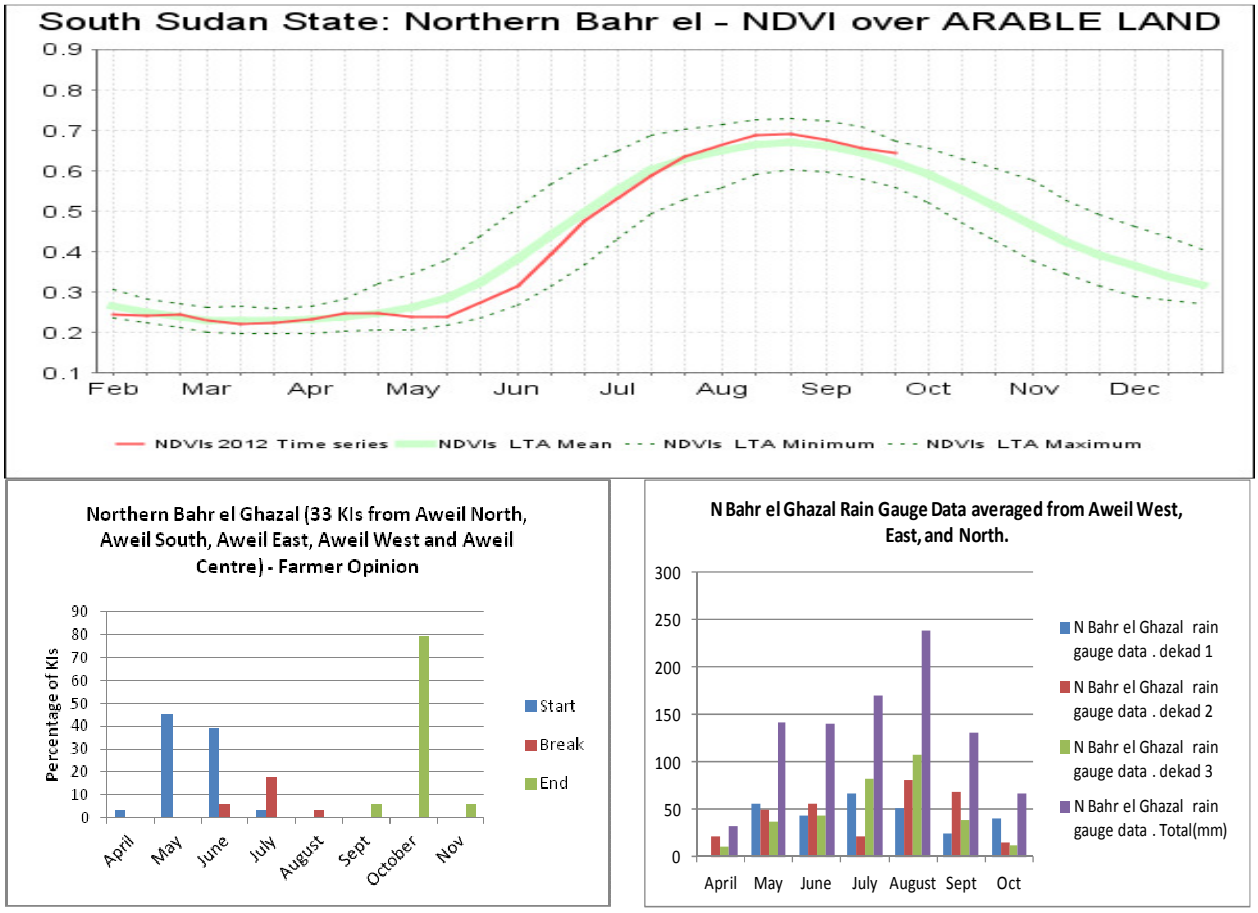
Warrap	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.83	0.05	0.05	0.93	0.19	0	1.12
Gross Production (t)	-	-	-	110 886	16 346	-	-

Groundnuts at household level will add an estimated 9 800 tonnes of cereal equivalents (gross dry matter); however, there are unknown numbers of commercial groundnut farms that are not being captured by the system, so their contribution to the state production is probably much higher. It behoves local staff of FAO and SMoA to try to assess the numbers and scope of such farms over the coming year.

Livestock condition is good throughout the state and pasture and water availability are adequate. As against these Mission team findings, VSF report a major HS outbreak that was checked by vaccination in both Tonj East and North counties. Vaccinations programmes were affected by absence of cold chains in some payams. However, livestock and livestock products prices are high and numbers are expected to have increased due to successfully negotiated grazing/raiding peace initiatives.

NORTHERN BAHR EL GHAZAL STATE

Figure IV-9: South Sudan - NDVI and local rainfall assessment summary – Northern Bahr el Ghazal State



The rains in Northern Bahr el Ghazal started well and on time in May this year, and were followed by below average but regular rains in June, a short break in mid-July, and then by heavier than normal rains until October, resulting in a far better production season than last year. The heavy rains in some areas of the state were responsible for the displacement of c. 3 000 households with concomitant losses of agricultural area; which, although problematic locally, were more than compensated for by increased planting and ratooning of early planted sorghums that will yield a small bonus crop in Aweil South. Unlike most other states, rainfall data were available to the Mission from ¾ counties and from the Aweil Rice Scheme and have been included in Figure IV-9.

The short-season sorghums (*cham, alep cham*), which are planted in most parts of the state except for the extreme south in April-May, performed well and were estimated forensically in all counties as part of the Mission's auditing role. The returns suggest yields above the estimates included that are matched by the yields of main crop sorghum measured as a standing crop in APAD's (Udham, Aweil West) 1 000 feddan tractorized scheme at 1.4 tonnes/ha. A slightly lower average yield (1.23 tonnes/ha) is reported on the 5 000 feddan SMoA scheme in Tonchol, Aweil East.

Apart from the tractor schemes mentioned above and 2 000 feddan of paddy rice grown on part of the Aweil Rice Scheme, the farming system is characterized by hand cultivation of household's plots by family groups, sowing local landraces of sorghum. The season, which has been free from serious plant pests and diseases infestations, has been much more productive than last year, as shown in Table A4.17.

The later maturing sorghum landraces planted in Aweil South are benefitting, with the ratoon crop of the early sorghum, from the late rains in November that are also, unfortunately, prolonging the flooding in the same county. Water logging and flooding do often seem to be associated with the new road developments in many of the areas, due to incorrect and inadequate culverts, and the clearly disadvantageous siting of the roads from a drainage perspective.

Table A4.17: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

N. Bahr el Ghazal	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	5 531	0.5	2 765	2 212	147 330	16 207	-13 995
Aweil Centre	1 209	0.8	967	774	47 804	5 258	-4 485
Aweil East	47 459	0.8	37 967	30 374	354 208	38 963	-8 589
Aweil North	19 680	0.9	17 712	14 169	147 579	16 234	-2 064
Aweil South	9 480	0.8	7 584	6 067	84 353	9 279	-3 212
Aweil West	23 916	1.0	23 916	19 132	189 969	20 897	-1 764
Total	**107 274**	**0.87**	**90 911**	**72 729**	**971 243**	**106 837**	**-34 108**

Contribution from other crops is noted in Table A4.18. The ecology of N. Bahr el Ghazal State does not support the widespread growth of cassava, which may be found in isolated pilot trials in Aweil West. Groundnuts, however, make a more substantial contribution.

Table A4.18: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

N. Bahr el Ghazal	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.71	0.05	0	0.76	0.15	0	0.91
Gross Production[1/] (t)	-	-	-	94 911	10 257[2/]	-	-

1/ Includes 4 000 tonnes from the mechanized sector (3 276 tonnes sorghum and 714 tonnes paddy rice).
2/ Unshelled.

Groundnuts at household level will add an estimated 6 154 tonnes of cereal equivalents (gross), however, as in Warrap, there are unknown numbers of *commercial groundnut farms* cultivated under *nafeer* and tractor-hire schemes that are not accounted for in this estimate, so the contribution of groundnuts to state production is probably much higher. Again, as with Warrap, it behoves local staff of FAO and SMoA to try to assess the numbers and scope of such farms over the coming year.

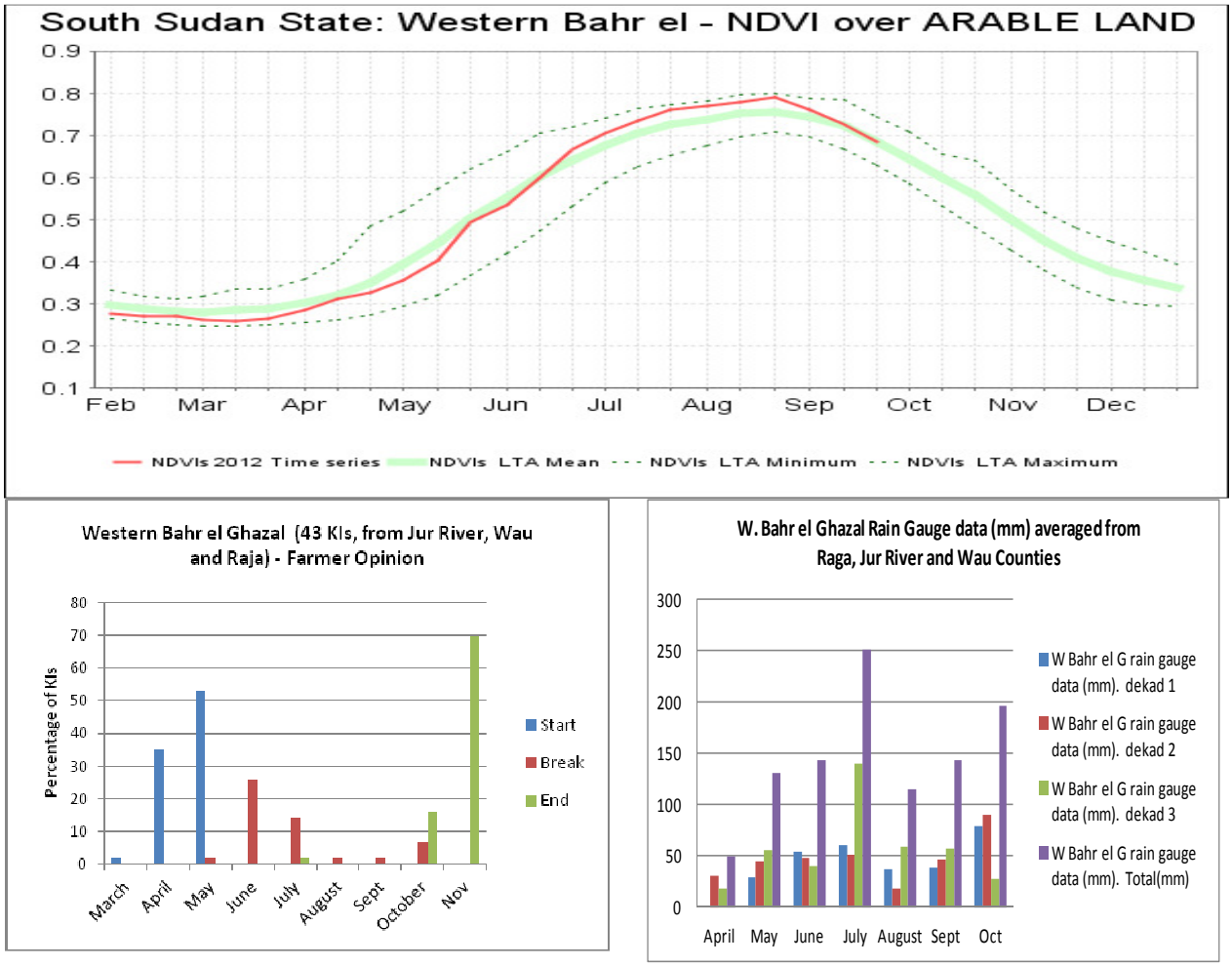
A much better season means falling grain prices. In October 2010, a malwa (3.7 kg) of sorghum in Aweil West cost SSP 4-5 similar prices are noted this year throughout the state and are expected to fall a little more in the coming month.

Northern Bahr el Ghazal is estimated to have a cattle population of 1.58 million in 2010. Cattle condition is generally excellent (PET Body Condition scores 3-4). Similar scores are noted for sheep and goats. Due to the good rains, pasture and water are abundant and livestock prices are high and firm throughout the state, despite the border closure. In other respects border closure has affected trade with the north as noted in Warwarra, which has been one of the most important cross-border markets for the past 20 years, channelling goods from Sudan into South Sudan. Now the roads from the market to the border are empty of vehicles, and produce sold by the stall holders is mostly coming up from Uganda.

In October 2010, a malwa of sorghum in Aweil West cost SSP 4-5 similar prices are noted this year. By September 2011 it had reached a peak of SSP 20 but then declined to SSP 8 by the end of October 2011.

WESTERN BAHR EL GHAZAL STATE

Figure IV-10: South Sudan NDVI and local rainfall assessment summary – Western Bahr el Ghazal State



The rains in Western Bahr el Ghazal started on time in May, and with the exception of short dry spells noted in August, have been above average, and far better than last year from a production perspective as noted by the NDVI.

Regarding area, a 30 percent overall increase, inspired by a general need to farm, an encouraging season, and readily available planting material in the form of seeds of local landraces of sorghum and cassava cuttings masks a decline in area in Raga, where, despite an increase in the farming population, some of the best farming land between the Raga and the western border seems to have been lost to military installations.

The total cropped area was slightly larger than that of 2010, with many farmers expanding their land with the favourable rainfall regime after July. Tractor services are limited to some 28 units being hired at SSP 50/feddan plus fuel (GOSS) and at SSP 150/feddan in the private sector. Fuel during the ploughing season was (and still is) expensive reaching SSP 240 per jerry-can containing only 16 litres in Raga. Spare part shortages are serious particularly in Raga, which seems to the Mission to be a county, more than any other that is failing to deliver its potential. The arrival of donkey ploughs from Darfur being used to till and inter-row cultivate was, however, an enlightening discovery especially as all parts may be made locally given a supply of raw materials. In this regard, the defunct railway lines are attracting the attention of blacksmiths.

The main sorghum landrace-*mabiol* and similar types such as *aiyella* that dominate planting, tall and long maturing (some of >200 days), are noted to be very well established and will give a good harvest in December and January. Other crops sown appear to come from low-level seed distributions to vulnerable families. GOSS seeds arrived too late for use, a common problem with seeds distribution programmes, and

have not been distributed. No other inputs are noted, contract animal dunging is not practised, although household waste and own livestock dung is used on the crops around the homestead.

A serious pest and disease free year suggests a far better cereal and groundnut performance than was reported last year as indicated in Table A4.19.

Table A4.19: South Sudan - County cereal area (ha), cereal production (t) and cereal requirement estimates

West Bahr el Ghazal	Cereal area 2012 (ha)	2012 gross yield (t/ha)	2012 gross cereal production (t)	2012 net cereal production (t)	Population mid-2013	2013 cereal reqt (t)	2013 surplus/ deficit (t)
Returnees to 2012	3 560	0.9	3 204	2 563	64 720	7 119	-4 556
Jur River	16 608	0.9	14 947	11 957	146 154	16 077	-4 120
Raga	7 221	0.85	6 137	4 910	62 158	6 216	-1 306
Wau	29 247	1.1	32 172	25 737	173 091	20 771	4 967
Total	**56 635**	**1.00**	**56 460**	**45 168**	**446 123**	**50 183**	**-5 015**

Contribution from other crops is noted in Table A4.20.

Table A4.20: South Sudan - Tentative estimates of cropped areas (ha) per household and state production levels

W. Bahr el Ghazal	Sorghum	Maize	Other cereals	Total Cereals	Ground-nuts	Cassava 2 years	Cultivated Area
Area (ha)	0.88	0.1	0.03	1.01	0.19	0.09	1.29
Gross Production (t)	-	-	-	56 460	6 363[1/]	61 896[2/]	-

1/ Unshelled.
2/ Fresh weight.

Cassava is plentiful throughout the state but grows best in Kpale, Wau County. The 2-year system of production is most common. Production this year is normal. Constraints include cassava mosaic disease to which local landraces are not resistant. Groundnut production is satisfactory this year, especially on lighter soils, no significant disease problems were reported. The contribution of cassava to food security in the state is conservatively estimated at 24 758 tonnes of cereal equivalent (gross dry matter). Groundnuts at household level will also add an estimated 3 692 tonnes of cereal equivalents (gross), however, as in Warrap and N. Bahr el Ghazal, there are unknown numbers of *commercial groundnut farms* cultivated under nafeer and tractor-hire schemes that are not accounted for in this estimate, so the contribution of groundnuts to state production is probably much higher. Again, as with Warrap, it behoves local staff of FAO and SMoA to try to assess the numbers and scope of such farms over the coming year. The Agricultural Bank in Wau have supported 30 to 50 farming entrepreneurs in Greater Bahr el Ghazal this year, which would seem to be a good place to start identifying the emerging farm enterprises.

The indigenous households of Western Bahr el Ghazal are not predominantly cattle-owners. The condition of cattle and goats is currently very good to be very good, with the dominant PET Body Condition Score 4 for both species. In all areas, pasture and water availability are generally adequate, livestock prices are firm.