

SPECIAL REPORT

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

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TABLE OF CONTENTS

Page

Mission Highlights	4
1. OVERVIEW	4
2. BACKGROUND TO SOUTHERN SUDAN	6
2.1 General	6
2.2 Agriculture	7
3. CEREAL PRODUCTION, 2008	8
3.1 Area estimates	9
3.2 Factors affecting yield.....	12
3.2.1 Assessment method	12
3.2.2 Rainfall	13
3.2.3 Inputs – Traditional sector	18
3.2.4 Pest and diseases.....	20
3.3. Agricultural production in 2008	21
3.3.1 Cereal production.....	21
3.3.2 Other crops	25
3.3.3 Livestock	26
3.4 Security	27
4. CEREAL SUPPLY/DEMAND SITUATION	28
4.1 Cereal balance.....	28
4.2 Cereal and livestock prices.....	29
5. HOUSEHOLD FOOD SECURITY SITUATION	31
5.1 Methodology	31
5.1.1 Tools and process.....	31
5.1.2 Limitations.....	31
5.2 Household food security and livelihood context	31
5.3 Current food security situation	32
5.4 Estimated food aid requirements in 2009	34
ANNEX 1 AGRICULTURE SITUATION BY ZONE (REGION)	35
ANNEX 2 FOOD SECURITY CONTEXT AND PROSPECTS FOR 2009, STATE	39
ANNEX 3 SOUTHERN SUDAN CROP CALENDAR	45
ANNEX 4 STATE LEVEL FOOD SECURITY SYNOPSIS	46
ANNEX 5 FOOD SECURITY ANALYSIS	50

Mission Highlights

- Generally favourable rains and relatively few outbreaks of pests and diseases, together with increased returnee population, have resulted in an above average cereal harvest of about 1.25 million tonnes, compared to 860 000 tonnes in 2007.
- With a 2009 projected population of 9.7 million, an overall cereal surplus of about 47 000 tonnes is estimated until next harvest.
- Satisfactory livestock and pasture conditions have prevailed over most of Southern Sudan.
- Despite the good harvest, however, the dismal road infrastructure and weak marketing system together with conflict related displacements and new arrivals of the returnee population, continue to place physical and financial constraints on access to food and make large numbers of vulnerable people dependent on food assistance.
- The poor state of transportation infrastructure is by far the most costly component of food marketing in Southern Sudan and the need for a concerted effort of rehabilitating/building feeder and trunk roads can not be overemphasized.
- In spite of recent declines, food prices in all markets are still much higher than in 2007. Further reductions are expected in the next several weeks as harvests from the long cycle sorghum begin to arrive in areas surrounding major markets.
- The recently concluded Annual Needs and Livelihoods Assessment (ANLA) estimated that about 1.3 million vulnerable people will face food insecurity during 2009 and will require approximately 96 000 tonnes in food assistance. This caseload includes about 239 000 returnees expected in Southern Sudan in 2009.

1. OVERVIEW

An FAO/WFP Crop and Food Security Assessment Mission (CFSAM) worked in Southern Sudan from 2 to 26 October 2008 to estimate cereal production and assess the overall food supply situation. The Mission included representatives from the Government of Southern Sudan (GOSS), Ministry of Agriculture and Forestry (MoAF) and the Southern Sudan Relief and Rehabilitation Commission (SSRRC), the European Union's Joint Research Centre (JRC) FEWSNet, WFP and FAO.

The Mission held meetings with officials of various ministries including the Ministry of Agriculture and Forestry (MoAF), the Southern Sudan Relief and Rehabilitation Commission (SSRRC) and the Southern Sudan Centre for Statistics and Evaluation (SSCSE); officials of UN and the other international agencies including the World Bank. State and location specific information was obtained by relevant state and local authorities and the NGOs including Norwegian People's Aid (NPA), Danish Relief Council (DRC), Mundri Relief Development Association (MRDA), Rural Action Against Hunger (RAAH), Catholic Relief Services (CRS) and Action Africa Help (AAH).

The Mission, comprised of 5 teams and 25 persons, was able to cover all 10 States of Southern Sudan. Helped by the positive effects of the Comprehensive Peace Agreement (CPA), two teams that covered the three States of East, Central and Western Equatoria were able to complete the Mission by road for the first time ever. The three remaining teams followed the practice of flying from main location to location.¹ On arrival at the locations the teams used locally available transport provided variously by local authorities, NGOs and local car/motor-bike hire businesses. In such a manner a far wider cover was obtained in 2008 than was previously possible. In all, 38 of the current 79 counties were visited and 155 semi-structured interviews were completed.

The following locations were visited:

Northern Bahr el Ghazal: Aweil Centre, Aweil East, Aweil West, Gogrial West; **Western Bahr el Ghazal:** Raja; **Unity:** Bentiu, Rubkona, Leer, Koch, Guit, Mayom, Pariang; **Central Equatoria:** Juba, Yei, Lainya, Morobo, Kejo Keji, Terekeka; **East Equatoria:** Torit, Kapoeta, Ikotos, Magwi; **Upper Nile:** Renk, Malakal, Panyikang; **Jonglei:** Bor, Pibor, Pochalla; **Warrap:** Gogrial; **Lakes:** Rumbek East, Rumbek Central; **West Equatoria:** Yambio, Nzara, Ibba, Maridi, Mvolo, Mundri West, Mundri East.

¹ The low-flying observation of farm fields was not an option in 2008 as only scheduled flights were available.

Information obtained from State Ministries of Agriculture, County Officers/Inspectors, farmers, traders, herders, staff of NGOs and international agencies were cross-checked against information obtained from the results of transects driven through agricultural areas, field observations taken by most teams using the Pictorial Evaluation Tool (PET), spot crop yield measurements, and from secondary data including FAO, WFP and NGO Reports. The Mission also undertook spot-check market surveys and, where the harvest had been completed, estimated quantities of stored grain in local on-farm silos. Limited information on cross-border trade was also obtained from officials at Nimule and Kaya (Uganda border) and Bazi (Democratic Republic of Congo border). The Mission Team received invaluable support (both technical and logistics) from the FAO Emergency Unit in Juba, Food Security Information for Action (SIFSIA) - Juba and Khartoum - and the WFP Vulnerability Analysis and Mapping Unit (VAM). Rainfall estimates (RFE) were provided by EU/JRC for 2008 and were compared with local rain-gauge data and traditional descriptions of the rainfall provided by informant interviewees. This was updated with information provided by SIFSIA-Khartoum with rain gauge data for inclusion in this document.

In accordance with the approach adopted in previous years, the Mission has estimated cereal production based on areas disaggregated to county level, derived from a model using the latest estimated settled population (CFSAM 2007) plus the International Organization for Migration (IMO) collated statistics for both spontaneous and organised IDP and refugee returnees that arrived between February 2007 and August 2008. Standard area estimates for average households in each county, adjusted by Mission observations made during the field visits are multiplied by yields/unit area used by previous CFSAMs again conservatively increased by the 2008 Mission findings from a more substantial and detailed coverage that show far higher yields of sorghum and maize than previously noted².

As well as the current harvest, the mixed cereal estimate includes grains to be harvested in the next 2 or 3 months, which consist mostly of the long-cycle sorghum planted in June in Upper Nile and Lakes and parts of Eastern Equatoria that will be harvested in January 2009. These fields are still vulnerable a) if the rains stop too early and b) if attacked by migratory *Quelea quelea* birds. The estimate also includes maize and short-cycle sorghum landraces that have already been harvested and eaten "green". The inclusion of these latter crops in the cereal balance used to determine surplus or deficit areas, anticipates a similar crop performance and availability next year, which may not be the case. Farming practices remain as described by earlier missions. Although there were adequate seed supplies among the settled farmers, IDPs and returnees and the vulnerable families in host areas, benefited from FAO-supported seed distributions.

The positive effects of 2008 mostly timely rains, with few significant breaks and no widespread flooding, augmented production in most areas with increased estimates of areas cultivated and enhanced yields.

The net result suggests that the estimated harvested area in 2008 is much higher than in 2007 at 1 million ha, a figure that includes the farming activities of numbers of returnees collated by IOM (August 2008). The gross production from the traditional sector in 2008 is estimated at 1.25 million tonnes connecting to an estimated 1 million tonnes of cereals available for consumption. The only on-farm stocks from previous years, noted by the Mission, are those held by farmers in Western Equatoria. These stocks are carried over from year-to-year and they are not included in the calculation of any surplus/deficit (assuming neutral stock-change). They comprise a mixture of cereals, oilseeds and pulses being mostly the least perishable crops such as finger millet and sorghum. Maize, beans and groundnuts are less likely to be stored on-farm unless produced for sale through the farmers' associations, unfortunately still thwarted by impassable roads, limited markets and high storage losses. This explains the higher/capita/annum consumption figure used in the balance, even for areas where the *preferred staple is cassava* as is the case in some of the southern counties of Central Equatoria and western counties of Eastern Equatoria.³

The harvest estimate noted above results in a theoretical cereal surplus of about 47 000 tonnes for a total mid-2009 population of 9.7 million people as projected by the Mission.⁴ However, the surplus is in reality a

² Using PET South Sudan, assessors were able to work with farmers to identify production levels from photos in the presence of their crops, rather than give highly dubious numerical estimates (bags/feddan) when most have no concept of either bags or feddan.

³ Cassava is of significant importance in West Bahr el Ghazal and Lakes and of increasing importance in Warrap. From samples taken and confirmed across the green belt up to Wau and Raja yields range from 15 tonnes/ha (two-year dug) to 30+tonnes/ha (three-year dug) fresh material.

⁴ The recently concluded population and housing census, whose results are yet to be published, is expected to provide a more accurate population estimate. As a result, estimated figures could change in either direction and a recalculation of the balances may be necessary on a county by county; state-by-state basis if differences in disaggregated figures become apparent. In the meantime the Mission assumes that the 2.85 percent increase to mid-2009 includes returnees.

theoretical construct as the current road infrastructure and marketing network preclude meaningful movement of grains from the myriad of small hand-cultivated, household farms in surplus areas in the south to most of the deficits areas located mainly in the northern parts of southern Sudan.

Cereal production from the mechanized sector, where the production is from sizeable units with a good marketing track record and good road access, is noted to be in the order of previous years at 142 560 tonnes of sorghum and millet from 165 000 ha. So far, pest threats to the mechanized sector based predominantly in Renk, have either been minimal or dealt with by the Renk-based GoNU plant protection unit. However, migratory *quelea* birds will remain a threat to the later sown crops until they are harvested in January. In this regard, the Mission draws attention to *quelea* colonies noted by a Mission team in the papyrus south of Terekeka and asks if this is a new nesting habit that needs to be addressed by plant protection specialists. Most of the cereal production from the mechanized sector, especially in Renk, is traditionally marketed in northern parts of Southern Sudan, due to better roads and lower transport costs, with only little volumes moved southwards to Malakal, and may not have a significant effect on bridging the gap. Therefore, production from the mechanized sector is excluded in the calculation of the cereal surplus/deficits in Southern Sudan.

Livestock in most parts of Southern Sudan are generally in good condition. This is reflected in the currently higher and stable livestock prices. The terms of trade, however, has deteriorated in the last several months due to the exorbitant rise in the prices of food commodities.

Despite improvements in the well-being of households in Southern Sudan, there are many obstacles that must be overcome to ensure the economic growth and development necessary for sustainable, long-term improvement in health, nutrition and food security. A major obstacle to progress repeatedly recounted to the Mission by all concerned remains the state of the transportation infrastructure. This poses a major problem for the movement of both people and commodities throughout the south, particularly during the rainy season. It also serves as a disincentive to produce surplus crops, as farmers find it expensive and very difficult to transport surpluses to markets. Thus, farmers in fertile areas often do not produce to capacity, even when there are food shortages in surrounding states. Rehabilitating existing infrastructure and building new, especially feeder roads would not only open up markets (improving livelihoods and food security), but it would improve access to health care, which could have a dramatic impact on both morbidity and malnutrition rates. Another phenomenon noted by the Mission is the growing tendency among the youth to leave their rural homesteads and settle in the towns leaving older members of the family to take care of the farming activities thus creating labour shortages at critical periods of cultivation.

Based on the Annual Needs and Livelihoods Assessment (ANLA) estimates, about 1.3 million vulnerable people (comprising 1.06 million residents and IDPs in need of food assistance and 239 000 expected returnees in 2009) will require a total of about 96 000 tonnes (73 500 tonnes and 22 500 tonnes respectively) in food assistance in 2009.

The Mission noted pre-positioning of significant amounts of cereals, mainly sorghum and maize, by the Government at strategic locations in different parts of Southern Sudan, possibly for subsidized sale or distribution. Despite a determined effort, the Mission was unable to obtain hard data and information on either the total amount of cereals involved or the size of the target population. This makes it difficult to analyse the possible impact of the plan on the evolution of food prices or on the food security situation of vulnerable people. Further probing of this issue is necessary, especially in the context of any planned humanitarian interventions.

2. BACKGROUND TO SOUTHERN SUDAN

2.1 General

The signing of the CPA triggered social-economic changes and has created the conditions for the return, since 2005, of an estimated 1.44 million people (IMO, Juba, 2008). At the same time, large numbers of internally displaced people (IDPs) have resettled in areas that were inaccessible during the years of conflict.

Major efforts to rehabilitate and rebuild social and physical infrastructures destroyed during the protracted years of conflict were embarked upon by the Government of Southern Sudan and partners. In addition, the Central Bank of Sudan (CBOS), in the year 2007, introduced a common currency - the Sudanese Pound (SDG) - thus addressing the transactional problems of dealing with multiple currencies. This has been accompanied by the establishment of a number of banks in major urban areas. With the exception of the oil-

industry spreading to all counties in Unity State and the booming construction and service industries in Juba, other job opportunities connect to small but noticeable increases in construction activities in the county towns; and income generating activities to a remarkable growth in motor-cycle traders and taxis, the former travelling 100 km weekly with produce and goods for the burgeoning markets. The draw of such activities cause the a) farm families to bemoan the loss of the young male workers and b) the arrival of farm labourers from the Democratic Republic of Congo and Uganda to work on farms in the counties bordering these two countries. Such activities are coinciding with significant price increases in most commodities including rates for agricultural work which are noted consistently at SDG 200/feddan for cultivating only (not clearing) across the Greenbelt. Overall the underlying socio-economic situation in rural areas remains much as described in previous years with communities in the lower rainfall zones, predominantly of the north and south-east, depending ultimately on humanitarian aid for food security.

The GOSS 2008 budget, approved at USD 3.428 billion, relates to the provisional budget outturn of USD 1.477 billion in 2007. Regarding budget distribution, the percentage received for agriculture *per se*, MoAF and MoARF (component of Natural Resources and Rural Development) is small (about 1.6 percent) compared to other sectors and is directed to the establishment of the senior cadre. However, staffing is still weak.

2.2 Agriculture

The agro-ecology of the south provides a growing season varying from 130-150 days/annum in the north to 280-300 days in the south-west. Consequently, agricultural performance varies considerably from place-to-place and from year-to-year ranging from the regular possibility of at least two consecutive harvests from the same area in the Greenbelt located from Tambura to Kajo-Keji to crop failures in the marginal areas of the East Equatoria and Northern Bahr el Ghazal.

Agricultural production is, for the most part based on small, hand-cultivated units presently farmed mostly by women-headed households belonging to larger family aggregations reflecting the polygamous nature of most communities. Animal traction is presently being introduced again, on a small-scale, by a new generation of FAO and NGO-based extension agents in Central Equatoria, Lakes, Bahr el Ghazal and now in Western Equatoria. The Mission findings in 2008 confirm the upsurge in interest, noted in 2007 as the newly established NGOs revert to the previous practice of former programmes of giving away free ploughs, the withdrawal of which, as full-cost recovery approaches for implements were introduced in the mid-late 1990s, caused the interest shown by farmers to drop away to nothing leaving piles of ploughs unsold.⁵ Deeper discussions in the oxen-ploughing areas in 2008 indicate that it is not just the *absence of spare parts* or the *absence of seasonal credit* to cover the cost of hiring labourers for the increased areas that causes ox-ploughing to be abandoned. The real cause may be the decision of the farmer to sell their trained (and often freely-provided bulls), after three years or so work and supplementary feeding and now fat and supposedly slow, *as slaughter beasts* without having made provision for any replacements, which raises serious questions regarding the structure of all the programmes and the usefulness of the intervention to farmers.

Only in the Upper Nile State districts of Renk, Melut and Wadakona and to a much more limited extent in Malakal and Bentiu (Unity State), is tractor-farming conducted at a level that could be identified with the commercial farms of South Kordofan and Blue Nile States. In both states, the ministries of Agriculture, Forestry, Animal Resources and Fisheries provided the visiting Mission team with general summaries of hectares covered in both the mechanized sectors.

Regarding cereals, in most small-holder systems farmers grow a wide range of sorghum landraces some of which appear in Annex 3, with minor crops of maize⁶, bulrush millet, finger millet and upland rice according to location. In the northern parts of Southern Sudan, other crops grown include groundnuts, which make a significant contribution to the household food economy replacing sorghum as the main staple in poorer sorghum-growing years when the rains begin later than usual; and providing a regular staple and cash crop in the higher localities with sandier soils. Green grams, cowpeas, beans, sesame, pumpkins and tobacco add to the biodiversity of the northern farming areas.

⁵ As noted in the 2007 CFSAM report, the supply of free ploughs is unsustainable. Renting the units, with hand-over in 4-5 years, may be a better approach particularly if all rented ploughs are serviced with spares by the agencies at the end of each ploughing season.

⁶ Maize replaces sorghum as the major cereal in the southern half of the Greenbelt and in riverine farms in Central Equatoria.

In the south and central areas, although groundnuts and the other crops are also grown in quantity, cassava is the most important contributor to the household food economy providing *at least half* of the carbohydrate ration. Minor crops of sweet potatoes, yams, coffee, mangoes, papayas and teak are also grown for home and some localized commercial use.

As a result of such variations and variable access to wild foods and animal products, WFP food economy estimates of the late 1980s, adjusted upwards by the CFSAM in 2003, suggest that war/immediate post war annual cereal use of the population ranged from 60-120 kg/caput/annum according to location. In the absence of other estimates, in 2008 the Mission has adjusted the consumption estimates upwards to a range from 80-120 kg/caput/annum to take into account:

- greater areas under cultivation to cereals/household;
- higher yields confirmed by team visits to larger catchment;
- greater circulation of people selling cereals at village level, e.g. considerable in motor-cycle traders;
- more cash in circulation;
- changing dietary practices, particularly influenced by returnees, e.g. reduced "gathering of wild fruits increased purchases of maize meal".

However, the Mission strongly recommends that a more appropriate body evaluates the estimates and current relevance through spot surveys during all seasons throughout Southern Sudan.

3. CEREAL PRODUCTION, 2008

As noted previously, the official gathering of agriculture statistics in all but limited areas surrounding towns previously held by the northern administration completely broke down during the civil war. Even in these towns, the Ministry offices, with the exception of Renk and Malakal, lacked equipment, simple materials and transport, which, compounded by access difficulties, undermined any intention of serious information collection. Although MoA offices have been created in every state and in all 38 counties visited by the Mission and access to wider catchment areas is now possible, data collected remain the same as before, that is to say field staff lack even the most rudimentary means of transport, materials, equipment and training. However, it is expected that information collection will improve in the near future with the provision of 28 motor vehicles and 28 motor bikes to the 5 States under the Sudan productivity Capacity and Recovery Programme (SPCRP).

Whereas high level staff positions have been created in State Ministries of Rural Development (or Agriculture) there is no apparent change in the staffing or working capacity of county offices. Therefore, the ability to collect data and the understanding of the usefulness of accurate data remain unchanged from previous years. These characteristics not only connect to shortages of staff, training, equipment and supplies but even the basic information relating to population, percentage of households farming or crops grown. It is also expected that quality information collection and analysis will improve because the SIFSIA Project has been undertaking agricultural statistics data collection in the states and have so far covered 7 out of the 10 States. Where rain gauges have been supplied, the data is rarely complete⁷, never displayed and regularly locked away to the extent that it is inaccessible to visiting Missions, *if the man with the data is out of office*.⁸ With seemingly little direction or purpose incumbents apparently attend courses, compile reports or just sit.⁸ Furthermore, at county and field level, the unpaid workers (volunteers) and many other paid field staff lack the practical numeracy and experience necessary for objective assessment⁹. The NGOs present are far better equipped and prepared for systematic data gathering and analysis but few engage in objective approaches, except for the gathering of rainfall data. Local crop assessment is, therefore, based on verbal exchanges between farmers and MAF/NGO staff in the towns and SSRRC/State Ministry volunteers/NGO staff dialogues with farmers elsewhere in Southern Sudan. Here, the propensity remains, at all levels, to sustain the dependency syndrome established during the OLS years whereby regularly reported *disasters* led to all manner of hand outs.

Against this background, the Mission visited a total of 38 counties in all 10 states encompassing the seven agro-ecological systems of Southern Sudan. In all, 155 case studies/key informant interviews were

⁷ If the observer is absent, rainfall is not recorded; a feature of many NGO and MoA collecting sites.

⁸ Weighing scales, quadrats, manuals, training in field mathematics and data handling are essential prerequisites before meaningful data will become available at any level for visiting missions and general planning purposes. Vehicles sitting in Juba need to be distributed, budgets for fuel and movement need to be prepared and furnished.

⁹ PET South Sudan was prepared to overcome part of these difficulties connected to yield assessment.

conducted as were field inspections of growing crops, crop yield estimations using the Pictorial Evaluation Tool¹⁰ and crop cutting and weighing and market surveys. Transect observations were made from the roads and river during the journeys, especially in greater Equatoria. Farms in use, fields cropped and the type and performance of crops grown were recorded. These practices should be rigorously extended to all teams in the Mission's movement from location to location. Transects add a further dimension to the assessing process placing case-studies of single farms into the general context of the areas visited. The sum of all activities of the five teams enabled the Mission to obtain an independent picture of agricultural production cross the south in a short period of time.

3.1 Area estimates

Given the data situation noted above, Mission area estimates for the traditional sector are compiled from derived population statistics for the traditional sector using numerical factors to determine:

- Number of households in each county was derived by dividing the mid-2008 population estimates from CFSAM 2007 plus the IOM collated data for spontaneous returnees and organised returnees up to August 2008 by an average of 6 persons/household.
- Percentage of households farming in the settled population in each county; plus percentage of IDPs farming (State level only) in 2008 as noted by and reported to the Mission.
- Area cropped by *cereals*/household farming in 2008, including home-gardens and far-fields as noted by and reported to the Mission.

As the percentage of households actually farming and cereal area/household is based on long-term Mission findings and local estimates in the areas visited or observed, not on accurate measurements, it is not possible to provide separate area data for each cereal. Nationally, sorghum is estimated to make up 70 percent of the total crop, however, in the Greenbelt, riverine Central Equatoria, in northern parts of Unity State and parts of Upper Nile maize is the dominant cereal planted and harvested at least twice in most locations.

Although local flooding was noted to have occurred in the usual areas (*e.g.* Aweil), much was either post-maturity or post-harvest so sorghum crops were harvested. Other claims of significant water-logging (*e.g.* around Terekeka) proved, during field visits to major sorghum growing sites, to be greatly exaggerated. In Unity and Upper Nile States local flooding occurred in what are essentially flood plains with replanting options. In summary, no significant extreme events are noted in 2008. Consequently, unlike 2007, in 2008 no deductions have been made from the numbers of household (hh) farming in any state due to floods or any other extreme events.

Table 1 displays by county¹¹ the population and derived data relating to the number of households (hh); percent of households farming; average cereal area/household; and total cereal area.

The population data used for the production estimates are also used as the basis of the mid-marketing year 2009¹² population estimates for the cereal needs from which surpluses and deficits are derived as shown Section 3, Table 3.

Given the improved conditions, cereal area/household is noted to be higher than in 2007 as the tendency for farmers to take advantage of improved access to agricultural land that the improved security offers, to plant away from their houses in far fields, has been continued. Far-field planting is noted to be increasingly common and include:

- Small, fenced units surrounding fertile areas around leguminous trees cultivated by family members in North Bahr el Ghazal and
- Large areas cultivated by *nafeer* or food/drink groups and gangs of labourers available for hire, working for individuals with cash to invest in agricultural expansion in areas further south in Gogrial, Tonj, Lakes, Central and West Equatoria except in areas along the borders, where the LRA still pose a significant threat.

¹⁰ Robinson I. and Stirling C. (2006) PET- South Sudan; A Pictorial Evaluation Tool for Crop Harvest Assessment in South Sudan. Centre for Arid Zone Studies, UK.

¹¹ Old county boundaries have been used as population figures for the new counties have not yet been published.

¹² Growth factor 2.6 percent per annum giving 8.99 million to which 1.156 million persons should be added making 10.146 million.

Presently, the greatest obstacles to an expansion of agricultural activities in the Greenbelt wherein lies a huge potential, within the confines of traditional hand-cultivation, are the appalling main roads, non-existent feeder roads, inadequate storage and an absence of buyers.

In addition to household farms, in parts of Torit, all of Kapoeta in East Equatoria and in Pibor and other parts of eastern Jonglei far-fields exist comprising large blocks of group-based, hand-cultivated sorghum, set apart from villages and usually inaccessible to assessors except during aerial surveys. As no low flying was undertaken in such areas in 2008, no observations were made regarding the extent or condition of such farms. However, there is no reason to suspect that such areas have not been farmed in 2008. Consequently, the traditional sector planted cereal area estimates are again higher in 2008 at 1.001 million ha from an increased population of farmers used to derive area data as shown in Table 1. It is also probable that farmers along the Sobat corridor will extend their recession farming of maize crops and ratoon crops of sorghum in Jonglei and elsewhere will flourish.

Table 1: Southern Sudan - Estimated settled population, farming households and cereal area in 2008

State/County	Population 2008	No. of households (hhs) (population/6)	% of Farming hhs	Number of farming hhs	Average area/hh (ha/hh)	Total area (ha)
Upper Nile	705 352			86 628	0.67	58 113
Returnee (07/08)*	15 852	2 642	60	1 585	0.5	793
Renk	21 151	3 525	38	1 340	2	2 679
Fashoda	52 947	8 825	90	7 942	0.84	6 671
Tonga	34 619	5 770	90	5 193	0.84	4 362
Sobat	44 649	7 442	80	5 953	0.63	3 751
Latjor/Nasir	430 456	71 743	80	57 394	0.63	36 158
Malakal	105 678	17 613	50	8 807	0.42	3 699
Jonglei	1 088 693			147 438	0.63	92 934
Returnee (07/08)*	14 972	2 495	78	1 946	0.5	973
Old Fangak	193 111	32 185	90	28 967	0.63	18 249
Duk	45 978	7 663	90	6 897	0.63	4 345
Nyirrol	19 704	3 284	90	2 956	0.63	1 862
Ayod	196 789	32 798	90	29 518	0.63	18 597
Twic East	86 700	14 450	90	13 005	0.63	8 193
Wuror	55 175	9 196	90	8 276	0.63	5 214
Diror	48 738	8 123	90	7 311	0.63	4 606
N.Bor	113 445	18 908	90	17 017	0.63	10 721
S.Bor	13 591	2 265	80	1 812	0.63	1 142
Bor Town	21 033	3 506	80	2 804	0.3	841
Pibor	167 708	27 951	50	13 976	0.63	8 805
Akobo	78 557	13 093	80	10 474	0.63	6 599
Pochalla	33 192	5 532	80	4 426	0.63	2 788
Unity	644 592			77 814	0.61	47 196
Returnee (07/08)*	38 577	6 430	65	4 179	0.5	2 090
Ruweng	53 397	8 899.5	70	6 229.65	0.63	3 925
Bentiu	63 099	10 517	50	5 258	0.42	2 208
Rubkona	56 094	9 349	50	4 675	0.42	1 963
Mayom	65 396	10 899	80	8 719	0.42	3 662
Guit	54 856	9 143	80	7 314	0.63	4 608
Koch	128 284	21 381	90	19 243	0.63	12 123
Leer	81 461	13 577	80	10 861	0.63	6 843
Panyijar	103 428	17 238	90	15 514	0.63	9 774
Warrap	1 842 830			269 672	0.81	219 355
Returnee (07/08)*	37 422	6 237	83	5 177	0.5	2 588
Twic	438 308	73 051	95	69 399	0.7	48 579
Gogrial	556 232	92 705	80	74 164	0.84	62 298
Gogrial Town	21 033	3 506	30	1 052	0.8	841
Tonj	789 835	131 639	95	125 057	0.84	105 048

State/County	Population 2008	No. of households (hhs) (population/6)	% of Farming hhs	Number of farming hhs	Average area/hh (ha/hh)	Total area (ha)
N. Bahr el Gazal	1 360 098			179 448	0.62	111 506
Returnee (07/08)*	172 522	28 754	58	16 677	0.5	8 339
Aweil W	300 068	50 011	95	47 511	0.55	26 131
Aweil N	202 492	33 749	95	32 061	0.55	17 634
Aweil E +Aw ak	422 184	70 364	95	66 846	0.55	36 765
Aweil S	238 665	39 778	80	31 822	0.7	22 275
Aweil Town	24 167	4 028	30	1 208	0.3	363
W. Bahr el Gazal	442 121			54 160	0.81	43 920
Returnee (07/08)*	37 964	6 327	68	4 303	0.5	2 151
Raja	38 164	6 361	90	5 725	0.84	4 809
Raja Town	58 843	9 333	60	5 600	0.63	3 528
Wau	223 172	37 195	95	35 336	0.84	29 682
Wau Town	83 978	15 000	50	7 500	0.5	3 750
Lakes	943 119			123 988		113 352
Returnee (07/08)*	79 728	13 288	82	10 896	0.5	5 448
Cuibet	101 273	16 879	95	16 035	0.8	12 828
Rumbek	381 866	63 644	80	50 915	1	50 915
Yirol	282 272	47 045	90	42 341	0.8	33 873
Awerial	97 980	16 330	90	14 697	0.7	10 288
West Equatoria	854 817			122 293	1.22	149 621
Returnee (07/08)*	16 882	2 814	50	1 407	0.5	703
Tambura	106 136	17 689	90	15 920	1.1	17 512
Yambio	256 333	42 722	90	38 450	1.3	49 985
Ezo	93 507	15 585	90	14 026	1	14 026
Maridi	178 121	29 687	90	26 718	1.2	32 062
Mundri	203 838	33 973	80	27 178	1.3	35 332
Central Equatoria	725 798			77 728	1.11	86 246
Returnee (07/08)*	20 182	3 364	50	1 682	0.5	841
Juba	70 610	11 768	80	9 415	1.2	11 298
Juba Town	105 062	17 510	20	3 502	0.63	2 206
Yei	293 609	48 935	60	29 361	1	29 361
Kajo-Keji	158 814	26 469	90	23 822	1.2	28 587
Terekeka	77 521	12 920	90	11 628	1.2	13 954
East Equatoria	840 496			108 804	0.73	79 397
Returnee (07/08)*	22 228	3 705	77	2 853	0.5	1 426
Torit	194 898	32 483	85	27 611	0.63	17 395
Budi	156 769	26 128	90	23 515	0.63	14 815
Magwi	128 021	21 337	90	19 203	0.7	13 442
Ikotos	153 900	25 650	90	23 085	0.84	19 391
Kapoeta	184 680	30 780	50	15 390	0.84	12 928
TOTAL	9 447 916	1 574 653		1 247 974		1 001 638

* Returnees are included at the State level and not at the county level.

Area data for the mechanized sector, provided directly to the Mission by the State Ministry of Agriculture in Upper Nile is based on planning data in 2008, rather than sown and/or harvested as in previous years. They indicate that large increases were planned. Aggregated possible planted cereal areas for Upper Nile State were obtained by the Mission in Malakal and are included in Table 2. Other crops planted in Upper Nile State mechanized sector are noted as 75 000 ha of oilseeds, mostly sesame; and 7 500 ha of groundnuts.

Table 2: Southern Sudan - Mechanized cereal area estimates in 2008

Location	Crop	Area (Demarcated) (ha)	Area (Undemarcated) ^{1/} (ha)	Total (ha)
Renk (Wadkona, Melut) and Malakal Bentiu	Sorghum	83 333	62 500 ^{2/}	145 833
	Bulrush millet	15 000	(included above)	15 000
	Sorghum	4 166	-	4 166
Total	Cereals	102 499	62 500	164 999

1/ Also called "traditional" by MoA, Khartoum. These are mechanized small farms < 500 feddan (210 ha) of mixed crops but mostly sorghum ploughed with hired tractors or tractors borrowed from the large scale demarcated farmers. These farms should not be confused with the hand-dug farms that make up the hand-dug traditional sector of Upper Nile included in Table 1 at 58 000 ha.

2/ Planning estimate.

Estimated area planted exceeds the harvested area reported in 2007, reflecting good early rainfall and continued funding by the Agricultural Bank and the Ivory Bank.

3.2 Factors affecting yields

3.2.1 Assessment method

Cereal production is determined by multiplying yield/unit area by the area estimates taking into consideration:

- Cereal crops harvested and consumed during the season, which complete the performance picture for 2008 and give a tenuous indication of what may be produced next year and will be available for consumption in 2009.
- Cereal crop yields from the on-going harvests, which are assessed by the Mission.
- Cereal production from a) the long-cycle sorghum landraces to be harvested in December-January and b) shorter cycle landraces planted in September and October, yields of which are very conservatively predicted from the plant populations, maturity and overall quality of the standing crop in various vegetative stages.

The first group, harvested in August and September includes maize and the short-cycle sorghum landraces *Cham*, *Nanjung*, *Rapjung*, *Abele* (Bahr el Ghazal) *Leuwalding* (Upper Nile), *Ossingo* (East Equatoria), *Kelle* (Central Equatoria).

The second group comprises the medium-cycle sorghum landraces *Alep Cham*, *Nyethin*, *Nyandok*, *Rabdit*, *Aleul* (Bahr el Ghazal) *Atari* (East Equatoria), *Ladoka* (Central Equatoria).

The third group includes a) the main local landraces of *Mabior* (West Bahr el Ghazal), *Aiyella* (Warrap), *Kec* (Lakes), *Gude* (East Equatoria) and *Agono* (Upper Nile); and b) *Serena* and *Bedele*, *Barre*, *Nyrangu* (West Equatoria).

An outline crop calendar is provided in Annex 3.

Each year the Mission must derive an estimate for the probable average yields in each state, which involves studying the factors that have affected yield during the season *viz* rainfall, seed supply, cultivation and weeding timing and methods, use of inputs, pest and disease challenges and local conditions *vis-à-vis* security and, regarding mechanized farming, access to credit. Such information is gained from detailed case studies with sample farmers and key informant interviews and is combined with Mission observations using PET, weighing of crop cut samples, review of secondary data from reports from GOSS and NGO sources and reviewing NDVI imagery for this season compared with previous seasons and the long-term average.

Where sorghum was already harvested at the time of the Mission but not threshed, which was invariably the case for all early sorghum and all crops in Northern Bahr el Ghazal, spot-checks of stored heads were used to estimate production/plant and the fields were inspected to determine plant densities from the stubble.

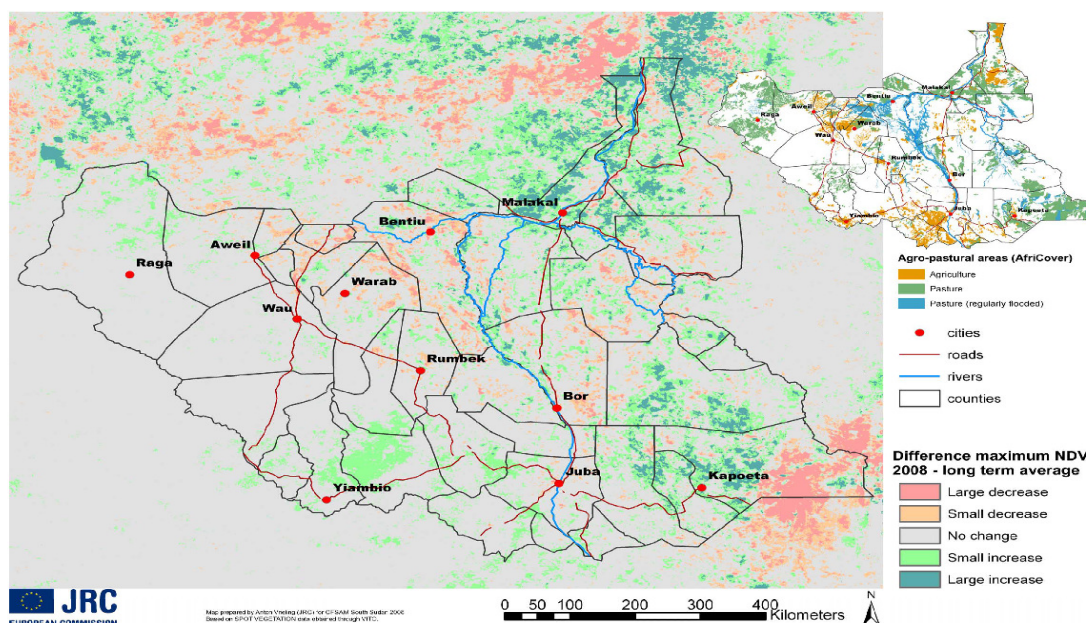
Yield estimates have been adjusted in 2008 to take into consideration the following factors ascertained from the semi structured key informant interviews, Mission PET and crop-cutting samples and the NDVI returns for the whole season compared with 2007 and the long-term averages.

3.2.2 Rainfall

Annual rainfall in Southern Sudan usually increases from north to south and from east to west ranging from less than 500 mm in the semi-arid lands of Northern Bahr el Ghazal and East Equatoria to a possible 1 800 mm in the Greenbelt. Following Mission data collection remote sensed data and rain-gauge data were combined and analysed by the agro-meteorological section of FAO-SIFSIA¹³ to provide a comprehensive picture of the rainfall pattern and quantity throughout Southern Sudan. The basic pattern, discernable across the south, was more variable than 2007, with rains starting early in most places at the expected time and continuing more erratically but with less intensity than in 2007, which, with lower levels in the Nile reduced the flooded areas to the zones that are regularly affected. The quantity of precipitation over the year is noted to be around normal resulting in:

- Average vegetation growth over the season being indicated in most areas.
- Better than average vegetation growth indicated in Renk, Malakal, Yambio, Torit, west and central Kapoeta and Pibor.
- Poorer than average vegetation growth indicated in locations in East Aweil, locations in north-west Warrap and locations in Unity State seemingly often interspersed with better than average performance.
- Poor vegetative growth in the pastures of south-east Kapoeta.

Figure 1: Southern Sudan - Seasonal NDVI: Comparison of 2008 with long-term average



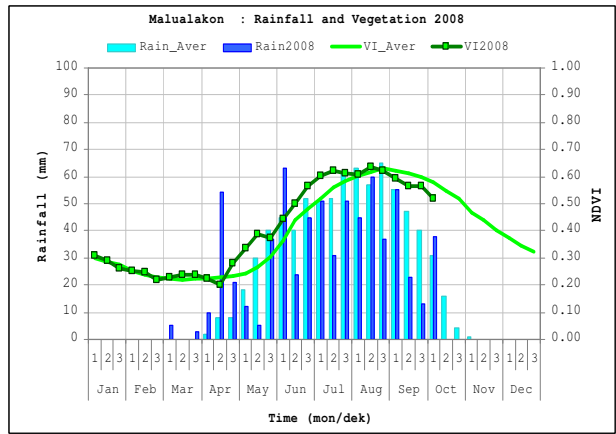
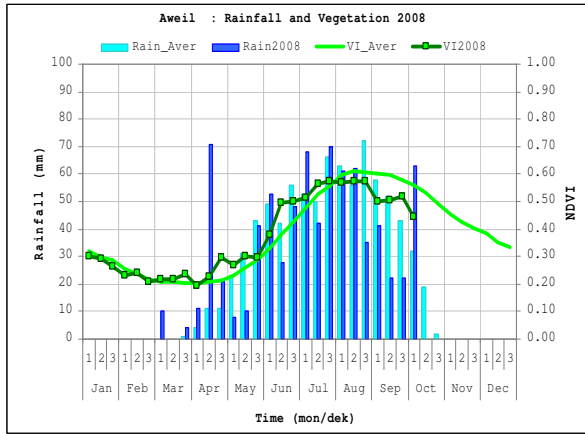
More detailed descriptions of the rainfall distribution and comparative vegetation indices in twelve locations are included in the graphs in Figure 2 below. These plots show the FAO-SIFSIA analysed remote sensed and rain-gauge data. The histograms of dekadal rainfall through the season to early October in most cases, compared to the long term average of 2007, generally confirm the overall average or better than average vegetation growth until September.

The first two graphs in Figure 2a depict rainfall distribution in North Bahr el Ghazal and show a timely start and good mid-seasonal rains with a variable tail, with rains falling off in late August and September during harvest time of the early planted sorghum; but picking up again across the area in October that will support late sown groundnuts.

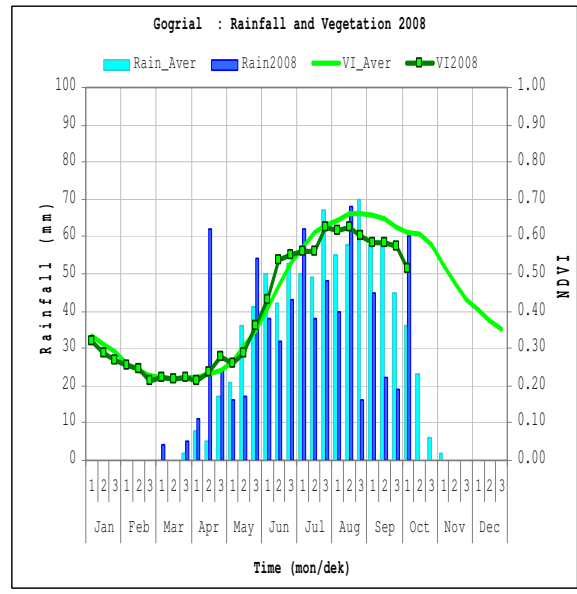
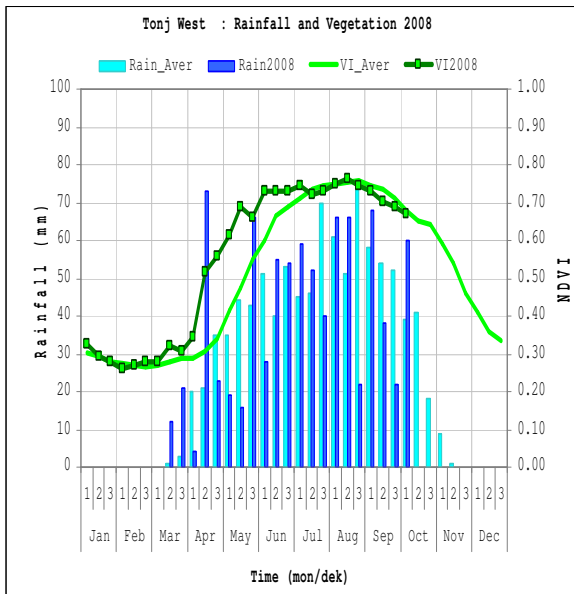
¹³ FAO-SIFSIA, Khartoum Office.

Figure 2: Southern Sudan - Rainfall distribution and vegetation indices in different states, 2008

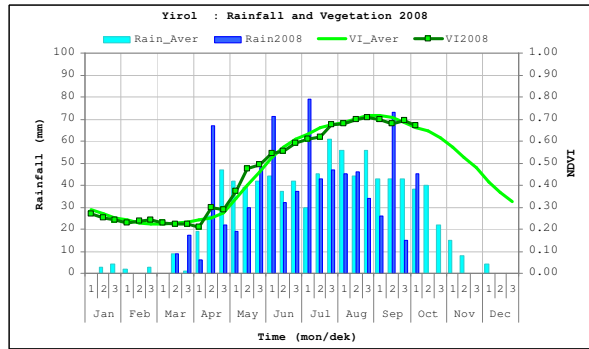
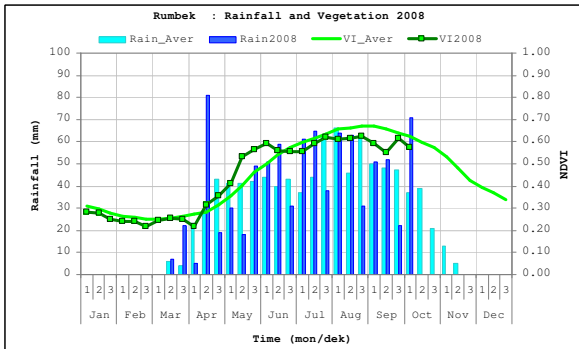
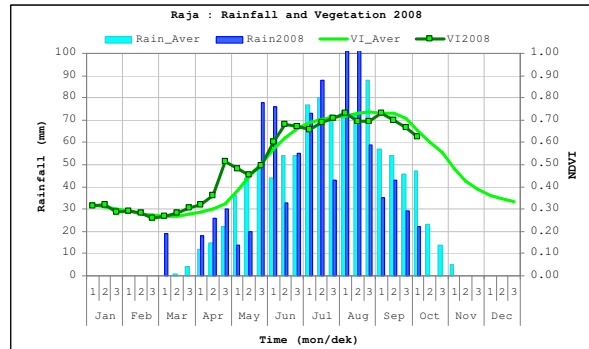
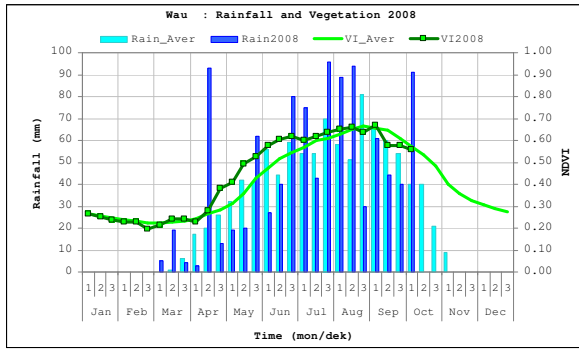
2a) Northern Bahr el Ghazal



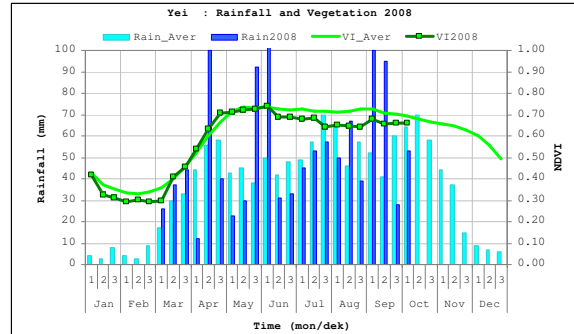
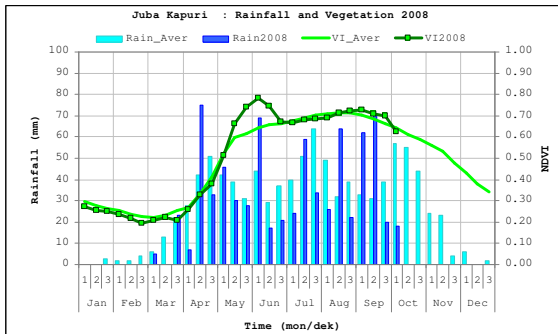
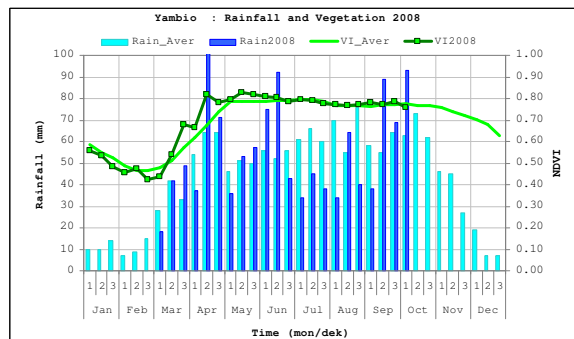
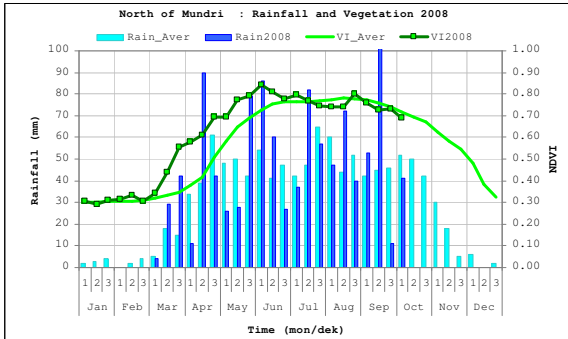
2b) Warrap



2c) West Bahr el Ghazal and Lakes

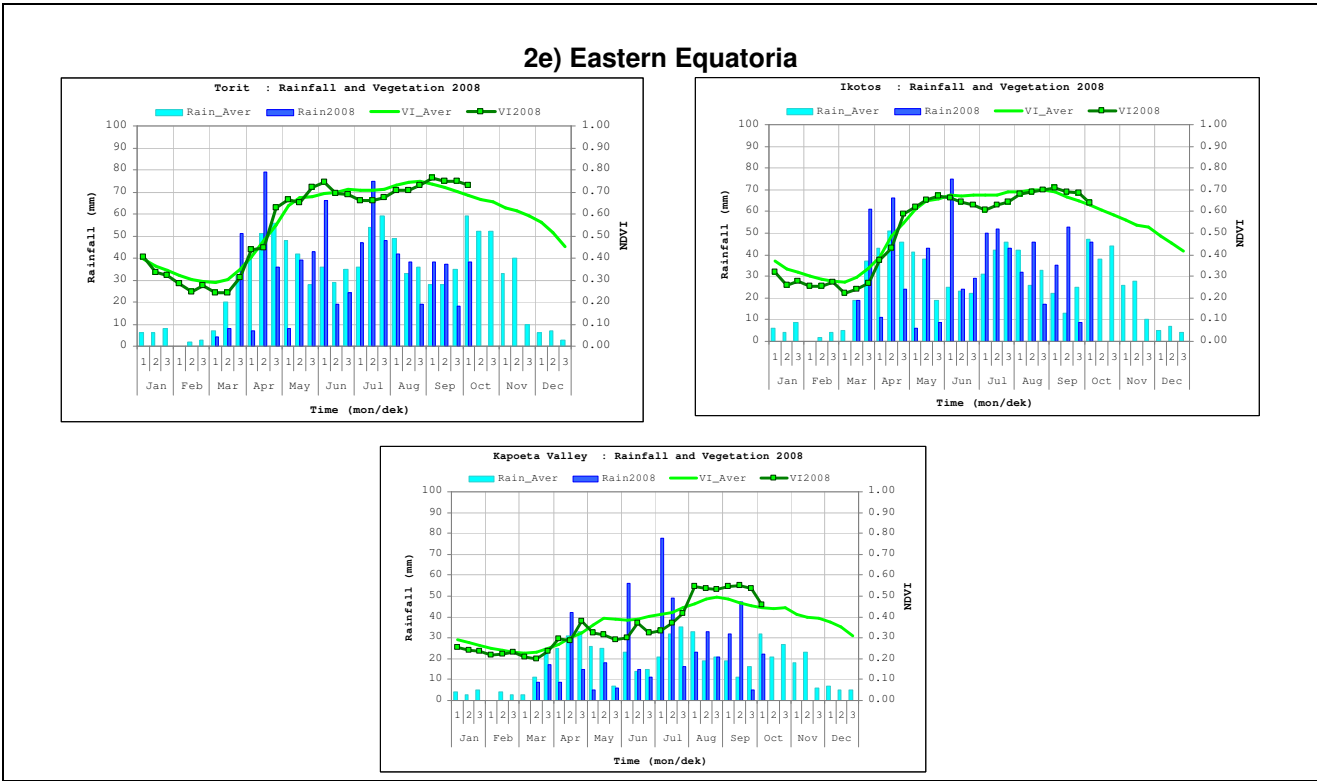


2d) Greenbelt and south Central Equatoria

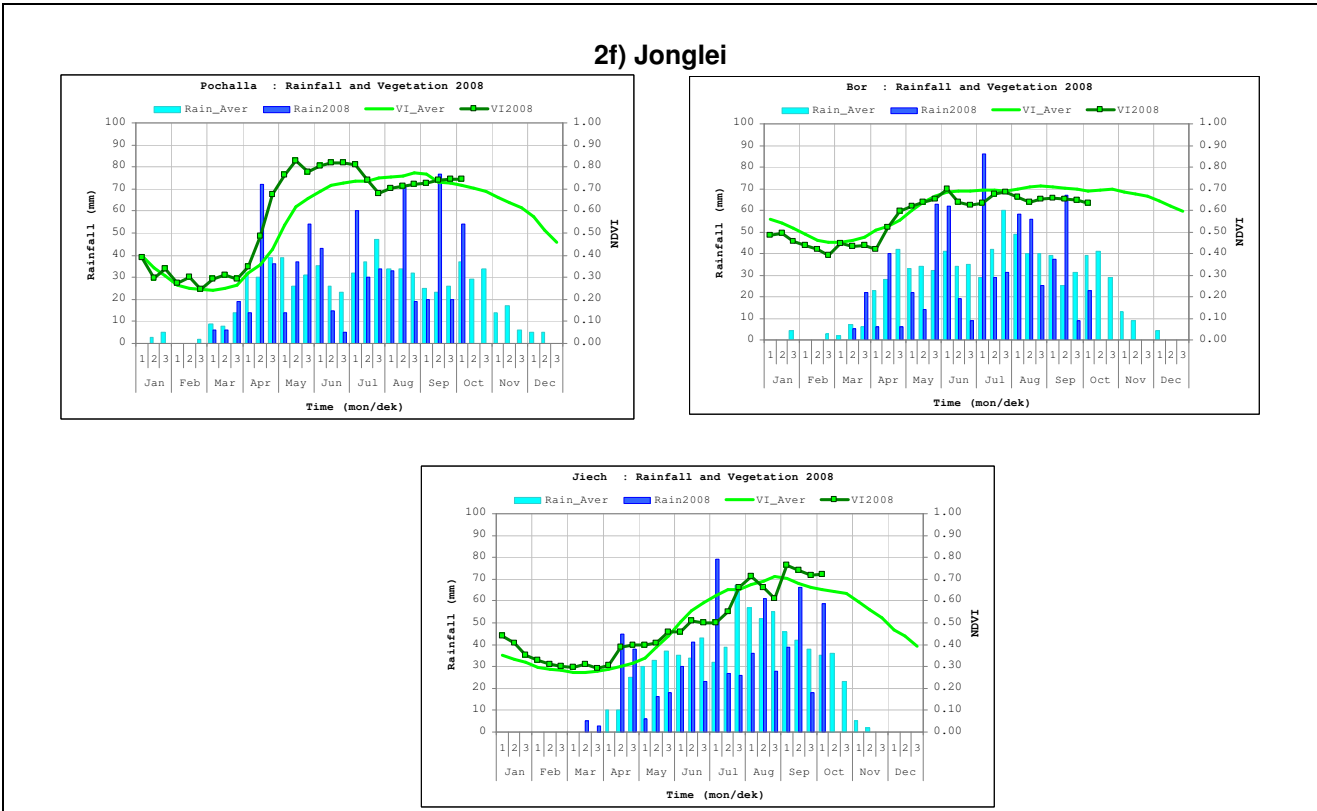


The four plots for the Greenbelt and south Central Equatoria in Figure 2d show an early start to the season and good rains throughout the season that still on-going with associated continued planting. The dip in vegetation index in Yambio is due to atmospheric interference of satellite data.

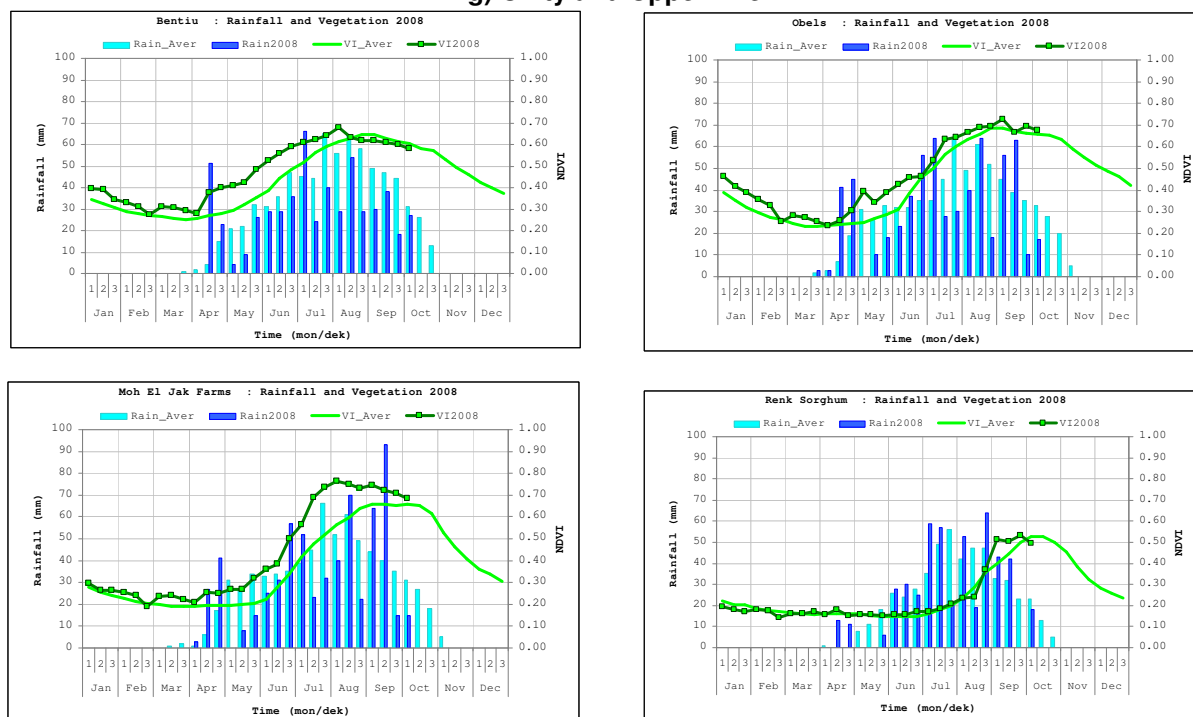
Torit, Ikotos and Kapoeta provide similar patterns of rainfall in East Equatoria as shown in Figure 2e with timely starts and good main season rain continuing into October.



Plots of rainfall for Jonglei, (Pochalla, Bor and Jeich) presented in Figure 2f continue to show timely starts, with breaks in June which may have required replanting of early sown cereals. However, good productive rains thereafter will have sustained such replants and later sown crops to good effect.



2g) Unity and Upper Nile



Notwithstanding the above data and comments, the semi-arid nature of the regions north of the Greenbelt is manifested in the highly variable nature of precipitation even in the same locality. The presence in Figure 1 of red *pixels* next to green *pixels* confirm the variability in rainfall and its effects on vegetation which depends so much on soil-type. Rain-gauges a few kilometres apart may show wide differences which means that although the overall picture is as described, there are certainly localities that will not have benefited and will have had too much or too little rain. A 10-day dry-spell can be a distinct advantage for crops growing on the heavier soils, but an equally distinct disadvantage on crops growing on sandier soils. It is also worth noting that local landraces encompass a far wider gene base than improved varieties. Consequently their growing patterns are far less rigid. For instance, within the framework of the landrace type, that is early middle or late maturing sorghum, events such as germination and emergence, flowering or seed fill take place over far longer periods compared to improved varieties that have been selected and bred to complete growth stages at the same time. Consequently, local landraces, which are by far the preferred seeds, are far more suitable than the improved varieties in such variable conditions. Despite *desk-prepared* claims to the contrary, although plants may be lost requiring gap-filling (a common occurrence in 2008) whole plantings are not lost due to 10-day dry spells. Genuine concerns associated with rainfall variations will be identified in the more detailed analysis of needs provided by the Annual Needs Assessment Missions that are presently ongoing.

The general effects of rain in 2008 may be summarized as follows:

- A good start but checks in May probably slowed performance of the early planted maize and short-cycle sorghums in most areas except West and Central Equatoria.
- No widespread replanting but *gap filling* by transplanting practised regularly to overcome patchiness in germination from dry-spell affected, early survival of 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 2007 in all localities, except for the two noted above,
- Extended planting of long-cycle sorghums and late planting of short-cycle sorghums and maize for December/January harvesting in all areas where traditionally practised.

- An improved performance to date over 2007, noted in all localities, due to improved access and better field estimation techniques with farmers identifying crop production ranges achieved from the PET Southern Sudan manual, with sample measurement cross-checks¹⁴.

Similarly, the 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 Renk and Malakal seen in Figure 1, suggests if access was available to machinery, most crops (estimated at 75 percent by State MoA-Malakal) should do well.

3.2.3 Inputs - Traditional sector

The traditional sector depends predominantly on family labour and hand power. As such, farm sizes are limited for the majority of households, to whatsoever land the farm families can clear, cultivate and weed with the ubiquitous flat-bladed long-handled hoe, the *maloda*, or the local short-handled, bent, digging hoe, the *turiya* and the east African hoe or *jembe*. Consequently, the median cereal area is estimated around 0.7 ha. This area is regularly extended by wealthier farmers through the use of *nafeer*-food and beer-funded labour groups; and through extended family/community farming of far-field blocks, through hiring labour gangs at rates according to workload – thus in West Equatoria clearing ranged from SDG 100-200/feddan, digging from SDG 150-200/feddan, weeding ranging from SDG 30/feddan in East Equatoria to SDG 100+/feddan in West Equatoria; and by self-help groups of farmer working in day-by-day cycles (“you today, me tomorrow”) to clear, cultivate and weed each others farms at no cost to one another. The Mission noted all such practices in 2008.

Regarding tool availability, the continuing expectation that agricultural intervention means the provision of free goods including tools is prevalent. In a sense, the expectations are being re-charged annually with the continuing distribution of tools to returnees and affected and *needy* families and to adherents of particular programmes (*viz* World Vision-Yambio). In 2008, FAO has distributed 274 000 items including hoes, malodas, pangas and sickles, through 36 NGOs to 101 000 households. In the absence of farmer credit, such gifts offer a solution to the lack of tools on the market for returnees and for isolated communities in remote areas like Boma, Pibor that do not attract itinerant traders; but for how long should such distributions continue? A credit-based supply system through local markets to augment supply in remote areas and increase access to poorer families or returnees, providing tools for all under similar conditions, is a far more sustainable and equitable solution and should be considered as an alternative to hand-outs to some families but not others because of arbitrary labelling.

Animal traction, introduced in earlier years in Yei, Lakes and Bahr el Ghazal and Central Equatoria can make a difference at household level with farm sizes more than doubling. So far, some 5 000 ploughs are estimated to have 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), Yirrol (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 fold¹⁵. Information gained from the last two CFSAMs and from interviews in 2008 and from the Mission’s own observations identified a number of 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.
- Ploughs are from various sources including Kenya, Uganda and NPA workshops in Kajo-Keji. Not all ploughs distributed suit the *in situ* soil conditions.

¹⁴ The in-depth field work the CFSAM required was not carried out evenly by all Mission members or teams. Satisfaction with previous assessing practices of “listen and report” is not good enough for a production-based assessments such as CFSAM now that access is much improved, time-in- field increased and basic information in the admin offices is both fragile and in many cases connected to the hand-out mentality.

¹⁵ For instance consider ox-ploughing decline in Mundri. In 1999, 65 ploughs were distributed and pairs of oxen trained by Christian Aid; by 2004 only 20 pairs were left working; by 2008 none of the pairs/ploughs was working. This decline is typical throughout most areas of Southern Sudan. NPA programmes are the exception, in both Kajo-Keji and Yei oxen-ploughing is becoming commercial at SDG 72/feddan (one-day) hire rates.

- Other than NPA, no programmes provide a supply-chain of spare parts so there is a regularly reported lack of spares such as landslides, bolts, chains, shears and wheels.
- There are no satisfactorily comprehensive training programmes for communities to address the problems noted above.

All of this has been previously reported in the CFSAMs, however, in 2008 other issues have also come to light:

- More manpower is required to weed the increased area. In good rainfall years, the financial demand of cash payment or repeat *nafeer* is often too expensive an input for the farmers to be able to afford as much as SDG 100-150/feddan. Therefore, full advantage of the extended area is not always enjoyed and planted areas get abandoned.
- No credit programmes exist to fund weeding. The Savings and Credit facilities, established at county level under earlier USAID-funded programmes, do not provide seasonal funds to farmers only short term loans to traders or trader groups.
- Oxen-training is, generally, of a poor standard, the pair of oxen after training and regular use still require three-person teams to control their actions and movement which demands more labour than hhs' can necessarily provide. This suggests NGO training practices need to be examined and certified as satisfactory on application to implement such programmes.
- Two-three 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. SDG 1 500/head or more, as butchers' slaughter beasts.
- Seemingly, very few farmers are either interested enough or well-trained enough to train their own replacements; or they are not interested in re-investing part of the money gained from old oxen sale in acquiring new young oxen for training.

The Mission feels that unless the preceding constraints are lifted, there is little chance of the last two attitudes changing. Previous ideas to improve the situation proposed in earlier CFSAM have been ignored, however, in the new context of 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 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 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) two-wheeled walking tractor and implements. This tool clearly has widespread application were extended family leasing/ownership will allow cost effective use.

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, training of trainers, oxen leasing, credit-support and the establishment of spare-part supply chains and blacksmith training.

Closer to the towns tractors are the preferred option for agricultural expansion. In 2008, tractors are beginning to feature in the Mission key informant interview returns in increasing numbers. GOSS has acquired 500 tractors ready for distribution before next year's cultivating season to include eight/State for use in county ploughing programmes. Emphasis on use at county level will be placed on community/private control not state ministry control of the assets; and many more tractors are said to be in the pipeline.

The Mission suggests that in an attempt to avoid the fate of so many previous *tractorisation* programmes elsewhere that see a rapid decline in usable units within a very short period of time, the following criteria are considered as conditions for release:

- The registration of at least two fully trained and named tractor drivers/unit.
- Certified training to include competent use of the engines' capacity, gears, independent brakes, hitching mechanisms, hydraulics, and all pieces of machinery/equipment distributed with the tractor units and knowledge of maintenance procedures¹⁶.
- Daily, weekly and monthly service schedules should be prepared for each unit and adhered to with penalties for not conforming to standard operating procedures.
- Spare parts and manuals in English and/or Arabic should be distributed with each unity.
- Supply chains for regularly replaced spare parts, tyres and tubes should be established before release.

The 2008 planned mechanized farming areas in Upper Nile show a large increase in area but unfortunately returns on areas planted are not detailed enough to determine achievements by location. However, tractorised targets are noted to have been met in Bentiu at about 4 000 ha and are clearly being used on larger farms around Juba. Three tractors are noted by the Mission to be working in West Equatoria (UNMIS, RAAH and Mundri administration). In Kajo-Keji and Yei tractors (numbers unknown) are available for hire at SDG 72/feddan.

Regarding seed supply, Mission teams 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 and 2008 is no exception. After experience gained under Operation Lifeline Sudan (OLS), 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. In 2008 and many previous years' Mission field samples confirm that local landraces perform at a far greater level than has been credited. Sorghum yields of the early and middle season varieties are clearly regularly over 3 tonnes/ha and are reaching 4-5 tonnes in the small plots. PET Southern Sudan was derived and prepared to explain these realities. Regrettably the Mission does not have a wide enough database to radically and dramatically alter the usual order of assessment by more than the lowest *acceptable* common denominators from the returns. Nevertheless the fact remains that most of the local landraces, many of which are listed in Annex 1 have an unrecognized potential that should now be realized by participatory selection, comparison and breeding programmes rather than be replaced by conveniently purchasable but less useful improved varieties.

In 2008, FAO purchased, imported and distributed 1 145 tonnes of assorted seeds including sorghum (240 tonnes), maize (350 tonnes), groundnuts (260 tonnes), millet (50 tonnes) rice (50 tonnes) sesame (63 tonnes), cowpea (132 tonnes) seeds from Uganda through 36 NGOs to 101 000 households. This compares to a very rough Mission estimate of 25 000 tonnes of assorted local cereal seeds probably sown by the 1.25 million households estimated to be farming in 2008. The FAO seeds are noted to have arrived in time for planting. Given Mission comments in the 2007 CFSAM regarding the efficacy of such programmes, which apply equally to the 2008 programme with regard to cereals and groundnuts, it is recommended that the distribution should be followed-up to look at the field performance of such seeds, not just whether they arrived safely and were distributed by the NGO partners. The Mission suggests that administrative ease of purchase should not be the only criteria for seed support. If quick, large-scale seed support is needed, providing the returnees with *extra* food grains (e.g. *feterita/agono* sorghum) from the north (Renk) to barter, locally, for local seed stock would probably be a far cheaper and better option.

The only use of pesticides or herbicides noted in 2008 was the limited use of weedkiller in Kajo-Keji and actellic (post harvest pesticide) in Yambio. Regarding the application of fertilisers, no use of chemicals is noted, however, farmyard manure use is well-regarded in farms in North Bahr el Ghazal, where previous Missions observed a) goat-dung being differentially distributed to combat the effects of striga, and b) farmers soliciting herders with offers of food and drink to graze stubble on their farms; and through the planting of valuable crops in cattle camps, a procedure also noted from Jonglei to Kajo-Keji to Lakes. Elsewhere, the low-level of occupancy and the newly re-acquired freedom of movement allows widespread shifting that is only challenged by tribal territorial clashes near county boundaries, pastoralist and farmer conflicts and the pillaging of the LRA in southern border areas.

3.2.4 Pest and diseases

In neither the traditional nor the mechanized sector were migratory pests noted or reported to the Mission in 2008. Common non-migratory pests noted include: local birds, rodents, millipedes, foxes, monkeys,

¹⁶ Not just the ability to drive in a straight line.

grasshoppers, termites, stem-borer and dura-bugs (Malakal) and sorghum black beetles (Renk). Regarding the mechanized sector, dura-bug sites were aerial-sprayed by the Sudan Government of National Unity (GNU) 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. Unfortunately, neither is there any apparent capability or plan to deal with outbreaks of migratory pests that might occur, which suggests a frightening level of vulnerability. More immediately, long-cycle sorghum crops, from Malakal to Raja are still vulnerable to the *Quelea quelea* migrations. No apparent possibility of aerial or ground spraying of nesting sites in the eastern areas of Upper Nile State border means that the risk so clearly demonstrated in Malakal 1998/99, when the mechanized farming harvest was lost, still pertains. Heavy *Quelea quelea* nesting colonies in the Nile papyrus just south of Terekeka was noted by the Mission. As this may be a significant change in nesting habits of a serious migratory pest, whose nesting sites are normally associated with woodland, further action is recommended to determine the extent of such habits and the possible elimination of the colonies.

Regarding weeds, the main problems in a good rainfall year such as this one are caused by the local grasses that invade continuously and must be kept under control. The Mission notes 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 at least once in the mechanized schemes in Renk. Striga is noted to be less of a concern in 2008 given the peace-induced, increased opportunity to shift areas of cultivation. Where farmers have continued to dig or plough exhausted plots (including areas of *mushrou* in the mechanized farms of Mohamed el Jack) the plant parasite remains a problem.

Regarding plant diseases, the major problems remain the same as in 2007 and comprising rosette virus and leaf spot of groundnuts, mosaic virus of cassava and sorghum smut. Unfortunately no further information is available regarding the fungal disease of bulrush millet in Ikotos noted in 2007, but it is unlikely that the infestation has diminished. Yield estimates have been adjusted in 2008 to take into consideration Mission PET and crop cutting samples and the NDVI returns for the whole season compared with 2007 and the long-term average NDVI provided in Figure 1 by the EU's JRC, Italy and the graphs in Figure 2 provided by SIFSIA, Khartoum¹⁷. They have been juxtaposed with the estimated areas to be harvested in Table 3 to provide an estimate of production.

The population data are also the basis of the mid-marketing year 2008 population estimates for the cereal needs from which surpluses and deficits are derived.

Regarding weeds, the main problems in a good rainfall year are caused by the local grasses that invade continuously which must be kept under control. The Mission notes that weeding once, twice and even three times was conducted throughout the traditional sector to get the best possible crops from the improved conditions. Striga is noted to be less of a concern in 2008 given the peace-induced, increased opportunity to shift areas of cultivation but where farmers have continued to dig exhausted plots the parasitic weed remains a problem.

Regarding plant diseases, the major problems remain the same as 2007 and comprising rosette virus and leaf spot of groundnuts, mosaic virus of cassava and sorghum smut. Further, in 2008 the Mission team noted a worrying spread of fungal diseases in the bulrush millet crops in Lorime, Ikotos which warrants investigation and action.

3.3 Agricultural production in 2008

3.3.1 Cereal production

A. Traditional sector

Cereal production estimates from the traditional sector in 2008 are derived from area estimates derived in Table 1. Gross cereal production estimates are provided in Table 3, disaggregated by county. The harvest is estimated to be 1.25 million tonnes from 1 million hectares, 43 percent greater than the 2007 estimates from an area 20 percent greater due mainly to:

- The estimated 5 percent increase in households farming.
- The increase by 12.6 percent in average farm size to 0.8 ha.

¹⁷ SIFSIA North (2008).

- No large harvested area reductions due to flood or other hazards.

The average yield estimate of traditional cereal production in 2008, at 1.24 tonnes/hectare, is 24 percent higher than the 2007 estimate due to a more conducive rainfall pattern involving less water-logging and improved estimates, with farmers and MoA staff identifying yields from photograph standards (PET Southern Sudan) rather than a routine repetition of “bags/feddan”. The yield figures mask a range included in the calculations from 0.4 tonne/ha in Aweil, Northern Bahr el Ghazal to 2.0 tonnes/ha in Yambio.¹⁸ It should be noted the Mission spot check sample crop cuts and PET observations return much higher figures, up to 3 tonnes/ha in Upper Nile, Lakes, Warrap and Equatoria, than the range used in the calculations for production. The yield estimates used in such calculations are the regularly noted *lowest common denominators* in each county and will remain so until such a time that the State Ministries can provide accurate data or sample sizes increase with a coherent network of indicator farms or a similar means of longer-term data collection.

In 2008, when harvesting, storage losses and seed use all estimated at 20 percent, are subtracted, the gross cereal production translates to a net production available for consumption of 1 million tonnes

Table 3: Southern Sudan – Estimated cereal area, yield, production, consumption and balance (traditional sector) in 2008/09

State/County	Area-harvested (ha)	Yield (t/ha)	2008 cereal production (tonnes)	2008 net cereal Production (tonnes)	Population mid-2009	Consumption (t/year) ^{1/}	Surplus (+)/deficit (-) (tonnes)
Upper Nile	58 113		49 278	39 422	723 691	64 788	-25 366
Returnee (07/08)*	793	1.1	872	697	16 264	1 626	-929
Renk	2 679	1.2	3 215	2 572	21 701	2 170	402
Fashoda	6 671	0.9	6 004	4 803	54 324	5 432	-629
Tonga	4 362	0.9	3 926	3 141	35 519	3 552	-411
Sobat	3 751	0.9	3 375	2 700	45 810	3 665	-964
Latjor/Nasir	36 158	0.8	28 927	23 141	441 648	35 332	-12 191
Malakal	3 699	0.8	2 959	2 367	108 426	13 011	-10 644
Jonglei	92 934		101 596	81 276	1 116 999	104 123	-22 847
Returnee (07/08)*	973	1	973	779	15 361	1 536	-758
Old Fangak	18 249	0.9	16 424	13 139	198 132	17 832	-4 693
Atar	4 345	0.9	3 910	3 128	47 173	4 246	-1 117
Nyirol	1 862	1.1	2 048	1 639	20 216	1 819	-181
Ayod	18 597	1.2	22 316	17 853	201 906	18 171	-319
Waat	8 193	1.1	9 012	7 210	88 954	8 006	-796
Wuror	5 214	1.1	5 735	4 588	56 610	5 095	-507
Diror	4 606	1.1	5 066	4 053	50 005	4 000	-447
N.Bor	10 721	1.2	12 865	10 292	116 395	10 476	-184
S.Bor	1 142	1.2	1 370	1 096	13 944	1 255	-159
Bor Town	841	1.1	925	740	21 580	1 942	-1 202
Pibor	8 805	1.1	9 685	7 748	172 068	15 486	-7 738
Akobo	6 599	1.2	7 919	6 335	80 599	9 672	-3 337
Pochalla	2 788	1.2	3 346	2 677	34 055	4 087	-1 410

¹⁸ These remain highly conservation estimates. Mission samples suggest Green belt yields per crop are greater than 2 tonnes/ha and with the second crop from second plantings on the same site are probably closer to 3-4 tonnes/ha. Similarly most fields in the driest parts of N Bahr el Ghazal will be producing closer to 1 tonne/ha. 0.4 tonne/ha may be found in over-used fields on the periphery of Aweil town. However, lack of coverage breeds caution. It is hoped that State MoAs will be equipped and trained to conduct objective assessments in the coming year or two.

State/County	Area-harvested (ha)	Yield (t/ha)	2008 cereal production (tonnes)	2008 net cereal Production (tonnes)	Population mid-2009	Consumption (t/year)1/	Surplus (+)/deficit (-) (tonnes)
Unity	47 196		46 251	37 001	661 351	59 814	-22 813
Returnee (07/08)*	2 090	1.2	2 508	2 006	39 580	3 958	-1 952
Ruweng	3 925	0.8	3 140	2 512	54 785	4 383	-1 871
Bentiu	2 208	1.2	2 650	2 120	64 740	8 416	-6 296
Rubkoana	1 963	1.4	2 749	2 199	57 552	7 482	-5 283
Mayom	3 662	0.9	3 296	2 637	67 096	5 368	-2 731
Guit	4 608	0.9	4 147	3 318	56 282	4 503	-1 185
Koch	12 123	1	12 123	9 698	131 619	10 530	-831
Leer	6 843	1	6 843	5 474	83 579	6 686	-1 212
Panyijar/Myandit	9 774	0.9	8 797	7 037	106 117	8 489	-1 452
Warrap	219 355		274 417	219 533	1 890 744	189 506	30 027
Returnee (07/08)*	2 588	1	2 588	2 071	38 395	3 839	-1 769
Twic	48 579	1.1	53 437	42 750	449 704	44 970	-2 221
Gogrial	62 298	1.3	80 987	64 790	570 694	57 069	7 721
Gogrial Town	841	1	841	673	21 580	2 590	-1 917
Tonj	105 048	1.3	136 562	109 250	810 371	81 037	28 213
N Bel G	111 506		83 604	66 883	1 395 461	118 435	-51 551
Returnee (07/08)*	8 339	0.9	7 505	6 004	177 008	19 471	-13 467
Aweil W	26 131	0.7	18 292	14 633	307 870	24 630	-9 996
Aweil N	17 634	0.8	14 107	11 286	207 757	16 621	-5 335
Aweil E +Aw ak	36 765	0.7	25 736	20 589	433 161	34 653	-14 064
Aweil S	22 275	0.8	17 820	14 256	244 870	19 590	-5 333
Aweil Town	363	0.4	145	116	24 795	3 471	-3 355
W Bel G	43 920		68 409	54 727	414 665	54 337	390
Returnee (07/08)*	2 151	1.7	3 657	2 926	38 951	3 895	-969
Raja	4 809	1.7	8 175	6 540	39 156	3 916	2 624
Raja Town	3 528	1.3	4 586	3 669	60 373	7 848	-4 179
Wau	29 682	1.6	47 491	37 993	228 974	27 477	10 516
Wau Town	3 750	1.2	4 500	3 600	86 161	11 201	-7 601
Lakes	113 352		136 216	108 972	967 640	91 824	17 149
Returnee (07/08)*	5 448	1	5 448	4 358	81 801	8 180	-3 822
Cuibet	12 828	1.3	16 676	13 341	103 906	9 352	3 989
Rumbek	50 915	1.2	61 099	48 879	391 795	39 179	9 699
Yirol	33 873	1.2	40 647	32 518	289 611	26 065	6 453
Awerial	10 288	1.2	12 345	9876	100 527	9 047	829
West Equatoria	149 621		272 163	217 730	877 042	96 821	120 909
Returnee (07/08)*	703	1.5	1 055	844	17 321	2 252	-1 408
Tambura	17 512	1.7	29 771	23 817	108 896	11 979	11 838
Yambio	49 985	2	99 970	79 976	262 998	28 930	51 046
Ezo	14 026	1.3	18 234	14 587	95 938	10 553	4 034
Maridi	32 062	2	64 124	51 299	182 752	20 103	31 196
Mundri	35 332	1.7	60 064	48 051	209 138	23 005	25 046
Central Equatoria	86 246		132 364	105 891	744 669	82 399	23 492
Returnee (07/08)*	841	1.2	1 009	807	20 707	2 692	-1 885
Juba	11 298	1.4	15 817	12 653	72 446	7 245	5 409
Juba Town	2 206	0.8	1 765	1 412	107 794	11 857	-10 445
Yei	29 361	1.5	44 041	35 233	301 243	33 137	2 096
Kajo-Keji	28 587	2	57 173	45 738	162 943	17 924	27 815
Terekeka	13 954	0.9	12 558	10 047	79 537	9 544	502

State/County	Area-harvested (ha)	Yield (t/ha)	2008 cereal production (tonnes)	2008 net cereal Production (tonnes)	Population mid-2009	Consumption (t/year) ^{1/}	Surplus (+)/deficit (-) (tonnes)
East Equatoria	79 397		86 880	69 504	862 349	91 656	-22 152
Returnee (07/08)*	1 426	0.9	1 284	1 027	22 806	2 965	-1 938
Torit	17 395	1.1	19 134	15 307	199 965	19 997	-4 689
Budi	14 815	0.9	13 333	10 667	160 845	16 084	-5 418
Magwi	13 442	1.5	20 163	16 131	131 350	13 135	2 996
Ikotos	19 391	1.1	21 331	17 064	157 901	20 527	-3 463
Kapoeta	12 928	0.9	11 635	9 308	189 482	18 948	-9 640
TOTAL	1 001 638		1 251 176	1 000 941	9 654 611	953 703	47 238

* Estimated surplus/deficit figures could change and a recalculation of the balances may be necessary once population estimates from the recently concluded population and housing census are made available.

^{1/} Assuming a consumption requirement of 85 kg of mixed cereals/person/year.

The estimated production is also contingent on the rains continuing over the next few weeks to support the growth of immature sorghum in Upper Nile, Lakes and parts of Jonglei including the growth and development of ratoon crops in Jonglei. It is also necessary to reiterate that this total includes all cereals harvested during the season, including those already consumed.

B. Mechanized sector

A Mission team visited the mechanized farming zones of Renk, Bentiu and Malakal in 2008 and obtained general/planning details relating to mechanized crop area and overall summaries of expected performance. Conditions reported for Upper Nile State, but not re-inforced by Mission field observations, contradict rainfall estimates and NDVIs which establish better than usual growth. Regarding the mechanized sector, a year with dry spells usually eases management of the vertisols a little, allowing windows of tractor access for the single pass discing/seeding that is the main later cultivation technique. The dry spells in August and in September may have afforded such opportunities, however, if prolonged, in some locations they also may have necessitated replanting of sorghum.

In the absence of detailed field observations, a general performance estimate given by the State Ministry in Malakal at 0.86 tonne/ha (0.36 kg/feddan) has been used in calculating production estimates for the areas of mixed sorghums and bulrush millet (Table 2). This manifestation will be contingent on rains in November and on a migratory pest free (*Quelea quelea*) remainder of the season. Consequently, the Mission estimates that 142 560 tonnes of cereals may be expected from 165 000 ha of which 91 percent will be sorghum.

C. Time series of cereal production

Time series of estimates of cereal production for the traditional sub-sector, for the past five years are provided in Table 4. Although it is difficult to interpret at sub-national level as county/state combinations vary from year to year, it is clear that all zones exhibit area increases due to *no flood deductions* and the inclusion of 2007/early 2008 *returnees farming*. Upper Nile Region shows a return to production levels estimated in 2005 and 2006. Bahr el Ghazal regional production estimates are higher due to area increases and by better yield estimates from West, Lakes and Warrap States. Production throughout Equatoria region has been boosted by area increases due to returnees and by rainfall patterns conducive to production and more realistic estimates in all States due to the improved road access to the two Mission teams enabling Mission field work in nearly all counties.

Table 4: Southern Sudan - Time series 2004-2008, cereal production in traditional sector

Zones	2004		2005		2006		2007		2008	
	Area 000 ha	Prod. 000 t	Area 000 ha	Prod. 000 t	Area 000 ha	Prod. 000 t	Area 000 ha	Prod. 000 t	Area 000 ha	Prod. 000 t
Upper Nile	138	82	204	167	226	189	142	123	197	196
Upper Nile	89	48	59	48	67	61	40	35	58	49
Unity	31	22	41	35	48	39	30	27	47	46
Jonglei	18	12	104	84	111	89	72	61	92	101
B el Ghazal	451	306	432	374	438	359	450	422	487	561
North	295	195	95	56	104	72	94	70	111	83
West	37	26	41	38	45	41	41	50	44	68
Lakes	119	85	111	103	111	95	104	107	113	136
Warrap	0	0	185	177	178	151	211	195	219	274
Equatoria	218	199	233	259	242	258	257	314	314	491
Central	79	66	75	77	71	78	70	74	86	132
East	32	20	37	26	45	29	61	51	79	87
West	107	113	121	156	126	151	126	189	149	272
TOTAL	807	587	869	800	906	806	849	859	998	1 248

Table 5 provides a five year time series for the mechanized farming sector. Although a Mission team visited the main sites fewer details are available in 2008. The areas may not be complete and yields are conditional on some rain in November and no *Quelea quelea* attacks in January.

Table 5: Southern Sudan - Time series 2004-2008, cereal production in mechanized sector

Region	2004		2005		2006		2007		2008	
	Area 000 ha	Prod. 000 t	Area 000 ha	Prod. 000 t	Area 000 ha	Prod. 000 t	Area 000 ha	Prod. 000 t	Area 000 ha	Prod. 000 t
Renk (r)	108	94	263	226	149	80	232	156	138	162
Renk (ir)	11	22	1	1	na	na	na	na	na	na
Wadakona	60	54	80	68	68	40	na	na	na	na
Melut (r)	8	8	-	-	2	1	na	na	na	na
Malakal	4	4	2	1	0	0	2	1	na	na
Bentiu	0	0	0	0	0	0	3	2	4	3
Total	191	182	346	296	219	121	237	159	142	165

na = not available; (r) = rainfed; (ir) = irrigated

3.3.2 Other crops

The agriculture potential of Southern Sudan is high. A wide range of field crops other than cereals, including vegetables, especially pumpkins and okra, and tree crops are grown successfully in all states. Presently, small quantities of oil seeds, tobacco and, less regularly, cotton, are grown in the traditional sector for household consumption and for occasional sales of small surpluses in local markets. Two other crops, groundnuts and cassava, are grown in quantity, the former throughout the states and the latter in all states except North Bahr el Ghazal, Warrap (some small quantities along field boundaries), Unity, Upper Nile and Jonglei.

Households farming on the sandier soils in North Bahr el Ghazal, grow groundnuts as both a shorter-cycle, later alternative to sorghum and as a supplementary food crop planted with early sorghums and maize for harvest in August/September. They are usually planted separately in the northern locations, in weed-free units of some hundreds of square metres, depending on family labour availability but have been noted by Missions in previous years to be grown in large multi-hectare blocks, farmed by tribal leaders/business men both using animal traction and tribal-extended family *nafeer* groups for sale or, apparently, for tribal based, traditional food-security support mechanisms. Each year, the area under groundnuts is expanding. Drying groundnuts were assessed in 2008 at numerous sites. Yields noted ranged from 1-2 tonnes/ha of the dry unshelled crop, significantly higher than previous estimates by other assessors. In Lakes and Equatoria, groundnuts are inter-cropped with cassava, sesame and sorghum as well as grown in small independent plots, during the Mission, the earlier planted crop had already been harvested and later season plantings were seen to be in good condition.

Cassava provides a family food security safety net throughout the Greenbelt, Lakes and Western Bahr el Ghazal and is also traded in local markets in the form of tubers, dried cassava chips and cassava flour. The cassava area varies from location to location increasing southwards west of the White Nile from a line drawn from Raja to Warrap. In Rumbek, the crop is noted to be planted around plot and household boundaries. In Wau and Raja, cassava is noted to be planted both as single cultures at centres ranging from 1-2 metres apart, as well as being inter-cropped with sorghum and sesame at a much wider spacing. In Western and Central Equatoria, inter-cropping of cassava is noted with a wide range of cereals, sesame, groundnuts and beans during the first year of its development. Agricultural practices for cassava are noted to be similar in Raja, Wau and the Greenbelt. They involve a fixed planting season in May-August when the cassava cuttings are planted with the second groundnut crop and other admixtures. (NB This practice provides a convenient way of estimating the probable area of the second and third year crops). Weeding occurs during the first year and into the second year (18-24 months) during which time either harvesting is started (more northerly growing areas) or, the crops are left for the forests to close around them during the third year (24-36 months) when harvesting is completed plant-by-plant as needed. To summarise, harvesting the plots is done either at the end of the second or third year depending on the land available to the household.

Both sweet and bitter cassava varieties are grown. Regarding the latter, after harvesting the tubers are skinned, chipped, soaked, dried and pounded to flour for use, storage and sale. Fresh matter yields of 5.8 kg to 11.6 kg/plant, planted at 2 metre centres were noted in 2005 in Raja, in 2006 in Wau and Yei; and up to 13 kg/plant at 1.5 metre centres was measured regularly by the Mission team in 2008 in West Equatoria, suggesting *consistent* fresh weight harvests of 15 tonnes/ha (two-year) and 30 tonnes/ha (three-year) in the main growing areas. Such yields are likely to be achieved in all the main cassava-growing areas in 2008 and the area is also likely to be increasing through the overall increase in security encouraging planting of far-fields and activities of NGOs promoting alternative crops (e.g. CRS East Equatoria). As against this, losses of fields to cattle appear to be of increasing concern and need to be addressed in specific localities, perhaps with some directives from the centre with regard to responsibilities. The cassava crop translates to enormous reserves of carbohydrates from Raja to Kajo-Keji and Yei that are as yet to be exploited.¹⁹

The mechanized sector incorporates large-scale sesame production in Renk. In 2008, the reported planted sesame area of 75 000 ha is higher than 27 000 in 2007 and returning to the order previously noted in Renk. However, no further information is available.

Pre-war developed plantations of timber, oil palm, tea and coffee are presently under review with regard to rehabilitation and exploitation. Of these, by far the most significant are the 72 x 10 000 ha plantations of high quality hard woods currently ready for harvesting. Details as to how these plantations may be resurrected are under discussion. By comparison, the areas under other crops being tea (121 ha) and coffee (42 ha) suggest to the Mission that new beginnings rather than rehabilitations are likely to be the way forward. In 2008, the noted emergence of several new private coffee plots in Morobo (Central Equatoria); Maridi and Nzara (West Equatoria) is encouraging inasmuch as they may herald the arrival of a new generation of long-term investors.

3.3.3 Livestock

No information was available from FAO Emergency Unit (livestock or information officers) regarding livestock development in 2008.²⁰ Generally, with 8 million head of cattle and 8 million head of small ruminants estimated to be kept in Southern Sudan, the contribution of animals to household food economies is considerable. If evenly distributed, this number would suggest holdings of 16 head/household. Under current methods of husbandry and terms of trade that are moving dramatically across Southern Sudan in money terms in favour of livestock owners with prices noted to be increasing in all states, family holdings of <15 head of cows or <40 head of ewes or does are required for pastoralist-based food security. Therefore, by extrapolation, <16 head of mixed stock/household provides a substantial contribution to the food economy in most areas. However, the animals are not distributed evenly, holdings range from 100's of head/individual to zero. Nevertheless, in all places, except Western Equatoria, more than 75 percent of the families reportedly have their own livestock and extended family relationships (kinship) afford the opportunity to share resources in most societies.

¹⁹ Improved road access is necessary to allow the development of village level processing plants for cassava flour and starch based derivatives (e.g. *gari/tapioca*).

²⁰ Given the existence of both livestock programmes and staff; and animal traction programmes and staff this lack of awareness or reluctance to share reports begs the question..." Why are these reports not prepared for the Mission before its arrival as is the case for the seeds and tools distribution?"

In 2008, the Mission has no reason to suppose that numbers of livestock have diminished. Cattle raiding may have altered local distribution patterns in Unity-Rubkona, Jonglei-Twic East, Duk; Upper Nile, Lakes-Rumbek-East and Central; West Equatoria-Mvolo and Central Equatoria-Terekeka- but no significant migration out of Southern Sudan, except for normal transhumance and movement of slaughter stock, is noted. The disease profile dominated by vaccinations for Contagious Poveine Pleuropneumonia (CBPP), contagious caprine pleuropneumonia (CCPP) and Black Quarter (BQ) but less mention of lumpy-skin disease is noted in 2008. A small percentage of animals were reported to have died from a disease that was not yet established in Aweil West.

Unfortunately, there are still no production data relating to birth patterns, birth indices, birth percentages or mortalities. However, as normal animal movement has not been restricted in 2008 due to flooding, Mission case studies suggest a better overall performance in 2008, confirmed by the good body condition (score 3-4) of cattle in most states; the abundant pasture; plenty of browse and plenty of available water. As recommended by previous missions, the lack of production data may be resolved by identifying and following indicator units of cows in herds selected in each agro-ecological zone. Whole herds were used by Western Sudan Agricultural Research Project (WSARP) in the 1970s for this purpose, however the Mission feels that subsets of breeding cows are enough to study throughout the year to augment the present levels of understanding of animal production, offer the opportunity to identify practical benchmarks with which to measure progress and provide the basic information needed for any livestock research/development programmes for livestock that have a concrete and discernable purpose, without revealing numbers owned of the participating herders.

Conflicts related to grazing and tension between pastoralists and cultivators is noted as a significant problem concerning the Director-General, Ministry of Agriculture, Juba, prompting policy makers to look towards land-use zoning and livestock corridors for movement control in the future. Reports of conflicts also appear regularly as a negative effect regarding pasture utilisation in the returns from the veterinary centres and were reported to all Mission teams in 2008 during field visits. The most dramatic include the failure of factions of Bor Dinka to return to Jonglei and re-emerging in West Equatoria causing havoc among graziers and settled agriculturalists²¹.

3.4 Security

Apart from the hit and run appearances of the LRA in the southern border areas, terrorizing villages and disrupting farming of far-fields in some locations up until August 2008, cattle raiding in the major cattle rearing areas and clashes between settled farmers and pastoralists in cross-over zones are noted as the major security concerns at both MAF headquarters and in the field. These clashes connect to land tenure and access, subjects familiar to FAO inasmuch as FAO started working on land tenure and access in 2001 when a study on legality and legitimacy on access to land, pasture and water in Sudan, in collaboration with Inter-Governmental Authority on Development (IGAD), was conducted. The findings and recommendations of the study, noted in 2007 and repeated again here, informed the GOS/SPLM peace negotiation process; and in 2004 an in-depth study on land and property in partnership with UNHCR and NRC and in collaboration with GOS and SPLM resulted in a series of interventions implemented on a pilot basis from 2005 until 2007. The results of these pilot studies are, seemingly, not yet available in the public domain. In 2007 FAO's land use tenure programme in Southern Sudan attempted to address issues of secure access to land and tenure security and restitution of land and property for returnees and vulnerable groups; land conflicts, and institutional capacity in a land administration-policy-law vacuum.

Key findings from the community relating to land tenure are:

- Territorial occupation by the communities has not changed significantly in the past 20 years except for people dislocated by the conflict or natural disaster like flooding and are slowly returning to areas of origin or to places that they hope to secure better livelihood opportunities.
- Traditional institutions of chiefs, sub-chiefs or headmen exist and have strong bearing on the socio-economic welfare of the communities including land administration/management.
- There is a strong legacy of territorial disputes mainly between community groups, e.g. administrative border disputes, disputes over grazing and fishing areas or watering points.
- Access to land to support livelihoods requires a strong emphasis on communal land rights.
- Temporary access issues.
- Acknowledge the difference between land use from land ownership.

²¹ SSRRC Secretariat, Mundri East, 2008.

- Negotiated access to community land.
- Strengthening direct access to land.
- Opportunity exists to address specific issues: women rights, urbanizations, participation in decision-making.
- Emerging institutions have limited capacity to engage on and effectively respond to land and property issues.

4. CEREAL SUPPLY/DEMAND SITUATION

4.1 Cereal balance

A much better performance of cereals in 2008 is reflected in a gross cereal production estimate of 1.25 million tonnes. With an average of 20 percent of the harvest deducted for post harvest losses for the crops yet to be harvested (November to January/February) and seed use, a domestic availability of about 1 million tonnes is estimated. This assumes the sorghum harvests in prospect (late-maturing 2008 and early-maturing 2009) perform as expected.

Cereal needs juxtaposed with production estimates in Table 3, are estimated at over 0.956 million tonnes for the projected, settled population of 9.7 million people, anticipating an average/capita consumption of mixed cereals of 98 kg/year.

The cereal/capita/year figure, which is applied to all persons of all ages, is based on 2008 Mission adjustments on the previous Mission adjusted WFP household food economy contributions of cereals. In 2008 increases to cereal intake have been made to accommodate greater production estimates, more access through increased trading, and the apparent change in diets as returnee numbers grow and influence society. In addition, as a result of Mission field interviews an extra proportion has been added to the per capita/annum consumption estimates in each county to cover *unspecified numbers of "guests"* that arrive and lodge in households for variable (unspecified and incalculable) periods of time in transit to their homes and final settlement.

This figure, averaging at about 98 kg/person/annum of cereals is still low compared to other African countries and presumes that other aspects to the annual food economy will be contributing as normal in all communities which are variously: **cassava, groundnuts**, beans, pumpkins, fish, milk, meat, domestic fruits, wild fruits and game. It also takes into consideration that in the northern towns there are fewer alternatives to balance the household food basket.

In 2008 the spontaneous and organised returnees collated by IOM (August 2008) are included. Given the improved agricultural performances throughout, there is positive balance of 47 000 tonnes. If the 142 560 tonnes of cereals from the mechanized sector is included, Southern Sudan is in surplus by about 189 000 tonnes but the concept of balance assumes that grain from areas of surplus is transferable to areas of deficit, which is not the case. Although some movement of surpluses between adjacent zones will occur through the activities of petty traders, who move from state to state by bicycle and increasingly by motor-cycle, neither the physical infrastructure nor the trading patterns yet exist that will enable the movement of large quantities of surpluses necessary to meet the estimated deficits in East Equatoria, Upper Nile, Unity, Jonglei or North Bahr el Ghazal. Only the surpluses expected in Renk might be moved in the dry season to deficit areas if suitable local purchasing arrangements were made.

Table 6: Southern Sudan – Estimated cereal deficit and surplus by state in 2008

Cereal Deficit States		Cereal Surplus States	
State	Amount in tonnes	State	Amount in tonnes
North Bahr el Ghazal	- 51 551	Warrap	30 027
Upper Nile	- 25 366	West Bahr el Ghazal	390
Unity	- 22 813	Lakes	17 147
Jonglei	- 22 847	West Equatoria	120 909
East Equatoria	- 22 152	Central Equatoria	23 492
Total	-144 729	Total	191 965

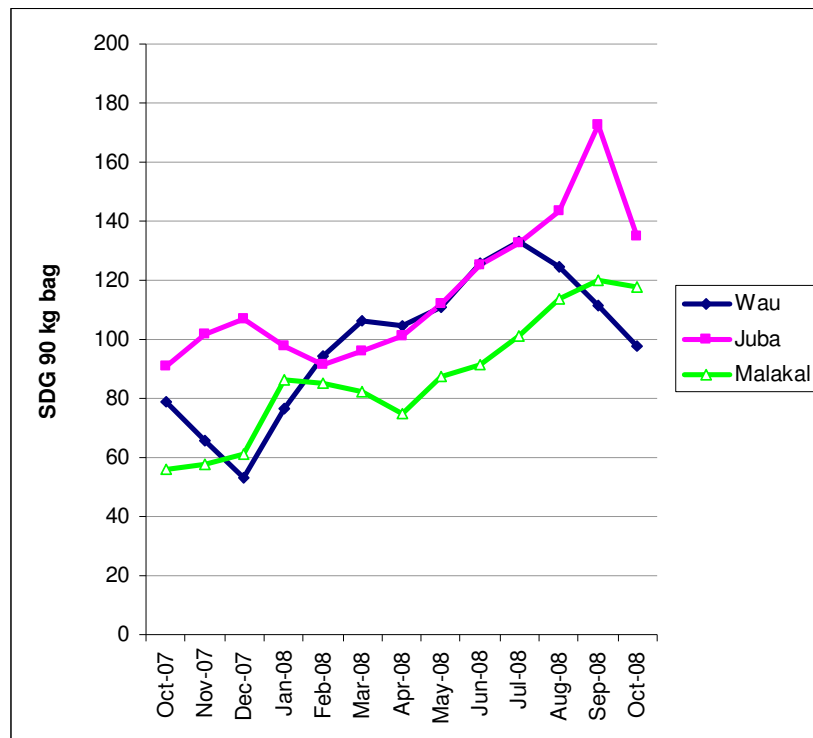
Note: As indicated earlier, estimated figures could change in either direction and a recalculation of the balances may be necessary once population estimates from the recently concluded population and housing census are made available.

4.2 Cereal and livestock prices

Cereal and animal prices were collected by the Mission during visits and a comprehensive database of prices for 2007 and 2008 was provided to the Mission by WFP VAM Unit. Using two indicators from the WFP data, sorghum and male goat prices, the Mission has prepared charts of monthly prices from late 2007 for three states; West Bahr el Ghazal (Wau), Upper Nile (Malakal) and Central Equatoria (Juba). The resulting charts and trends are shown in the below Figures.

Nominal wholesale prices of major cereals have generally been increasing trend in 2008. As shown in Figure 3 sorghum prices demonstrated high levels of increase since the beginning of 2008. For instance in Juba, prices in October 2008 were about 50 percent higher compared to the same month in 2007. Despite recent declines, food prices in all markets are still much higher than in 2007. However, further reductions are expected in the next several weeks as harvests from the long cycle sorghum begin to arrive in areas surrounding major markets.

Figure 3: Southern Sudan – Sorghum prices in selected markets, 2007/08

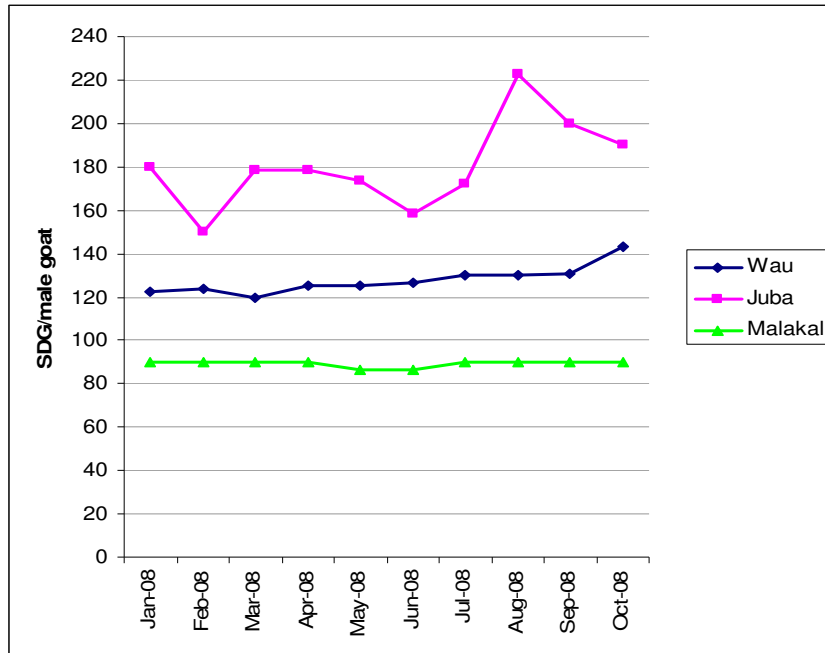


Source: WFP VAM 2008.

Inflation pressure on all food commodities is rather high despite a reported decline the biggest jump of cereal prices in April 2008. The Southern Sudan Centre for Statistics and Evaluation reported recently that the general and food inflation have shown a slight decrease in August – general inflation in Juba decreased from its high level of 36 percent in July 2008 to 28 percent in August. However, the general inflation rates in Juba are still very high and leaves poor households who are net buyers of these staple foods, feeling further squeezed. There had been efforts by the Government to contain recent price rises or to soften the impact of soaring prices on the domestic market, including pre-positioning of food commodities in strategic locations around Southern Sudan and the subsidized sale of sorghum and maize. However, these instruments have yet to restore cereal and other food prices close to their average levels in many parts of Southern Sudan.

Prices of livestock remained firm since 2007 indicating the absence of distress sales as pasture and water conditions were adequate for most of the period. For instance, as indicated in Figure 4, the price of male goats for meat in Juba has increased from SDG 130 in October 2007 to about SDG 220 in August 2008 (78 percent increase) before it declined to about SDG 190 in October 2008. In Wau, the increase is rather moderate and steady, while prices in Malakal have almost remained unchanged, at about SDG 90, in Malakal.

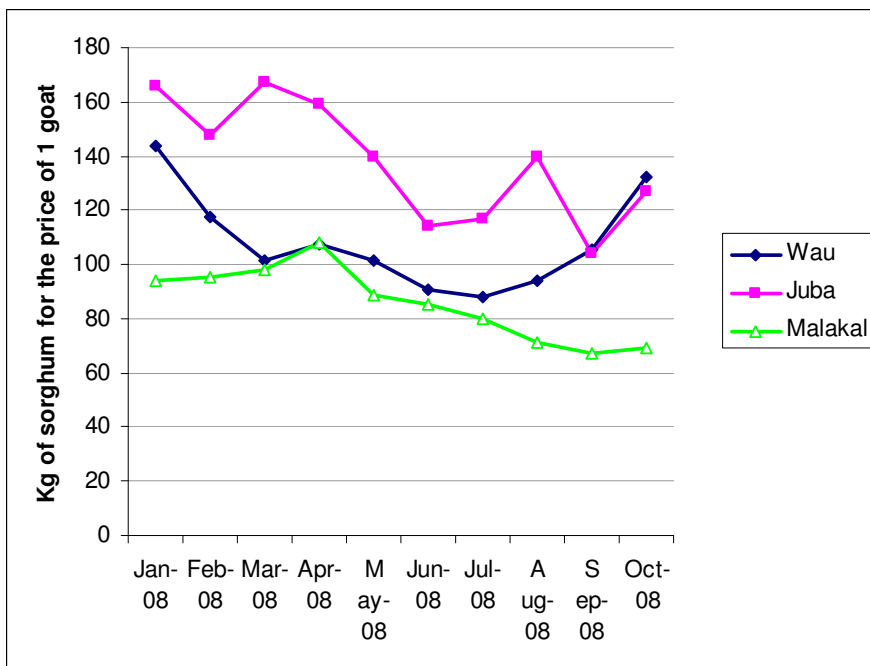
Figure 4: Southern Sudan – Male goat prices in selected markets, 2007/08



Source: WFP VAM 2007.

The grain-livestock terms of trade started to deteriorate to the disadvantage of livestock owners as cereal prices continue rising at an accelerated rate (Figure 5).

Figure 5: Southern Sudan – Terms of trade sorghum/goat in selected markets, 2007/08



Source: WFP VAM 2007.

The observed deterioration in sorghum/goat exchange for the last several months was the result of sharper increases in sorghum and other cereal prices compared to those of livestock prices. In other words, the amount of sorghum than can be obtained in exchange for one male goat have declined despite the generally high or increasing prices of goats. For instance, In Malakal, market prices suggest that a goat which used to fetch about 140 kg of sorghum in October 2007 was worth almost half of that at about 70 kg in October 2008.

5. HOUSEHOLD FOOD SECURITY SITUATION

5.1 Methodology

5.1.1 Tools and process

For the household food security analysis, the CFSAM relied heavily on the 2008 Annual Needs and Livelihoods Assessment (ANLA). During this exercise, primary data was collected in eight of the ten states in South Sudan²² using structured questionnaires both at household and community level. The data collection was designed so that the results would be statistically representative at state level. Multi-stage cluster sampling method was used for sampling. During this exercise, almost 4 500 households were interviewed across 150 villages in eight States and some 300 Focus Group Discussions (two/village) were conducted to provide both a quantitative and qualitative understanding of food security and livelihoods across South Sudan²³.

In addition, secondary information was reviewed and analyzed before and during the assessment process. The data review helped to appraise the general understanding of livelihoods, including the food security trends in different regions. Key food security partners and other agencies were consulted throughout the process, both informally and through the formal Livelihood Analysis Forum (LAF/IPC) process to make sure findings were crosschecked and to get external points of view.

Household and community questionnaires were entered using Microsoft Access, CSPro, and Filemaker Pro data entry application. Data entry was performed in Juba with the help of data clerks from the Southern Sudan Commission for Census, Statistics and Evaluation (SSCCSE), with additional support by WFP Khartoum. Data were then analyzed using SPSS (Statistical Package for the Social Sciences).

5.1.2 Limitations

- Because of accessibility issues, the most isolated and flooded parts of each state were not visited during the ANLA. These include Maban and Old Latjor County in Upper Nile, large parts of Jonglei and Lakes state.
- Being a post-harvest assessment, it is possible that the timing of the assessment could have an influence on some of the food consumption variables. Findings might have been different if done during the hunger gap.
- In addition, data collection errors are frequent in any assessment. Although all enumerators underwent thorough training in the data collection tools and methodology, the likelihood of data collection errors is still very much present.
- Also, the population figures used for the sampling (UNICEF/NID) are not seen as reliable as a lot of population movements (and redrawing of county boundaries) have occurred following the signing of the Comprehensive Peace Agreement (CPA) in January 2005.

5.2 Household food security and livelihood context

Traditional livelihoods in South Sudan typically depend on a combination of cattle rearing, crop production, fishing, wild food collection and trade, with great variations in the exact combination of these sources in different parts of the area. This can partially be explained by agro-ecological conditions. However, culture and traditions of the different tribes also plays a major role in understanding livelihoods.

In the far south-east corner, (see Figure 6) the arid conditions make cattle rearing the most viable livelihood option and the zone is almost entirely pastoralist. On the other hand, in the greenbelt area of the southwest, agriculturally oriented tribes rely mostly on surplus agricultural production, also because the tsetse fly makes cattle a difficult option in this area.

But for most households in South Sudan, cattle rearing provide the fundamental basis for wealth and status. Crop production is seen as an inferior activity more because of cultural rather than agro-ecological reasons. Nevertheless, crops do play an important complementary role in all zones, and pure crop producers can also

²² The assessment covered all of the States in South Sudan, except Central Equatoria and Western Equatoria.

²³ The plan was to cover 20 villages (clusters) per State and 30 households per cluster. Actual cluster coverage was lower in Jonglei and Lakes States due to problem of physical accessibility of some of the selected villages.

be found across the area. Fish and wild foods also play important roles, especially in the areas along the Nile River and its tributaries.

Access to food is seasonal and location-dependent, and traditionally livelihoods in South Sudan move around to exploit these seasonal patterns. This is true for fish and wild foods, but also livestock that depend on regular migrations in search of pasture. This mobility is also crucial to most of the trade that takes place in South Sudan, as households constantly exchange labour and cattle for crops and other local products as they move around. The most serious food insecurity situations arise in situations where conflict constrains this mobility, and the devastating famine in Northern Bahr El-Ghazal 1998 is tragic evidence to how serious outcome this ultimately can have.

Figure 6: Southern Sudan – Livelihood zones of South Sudan

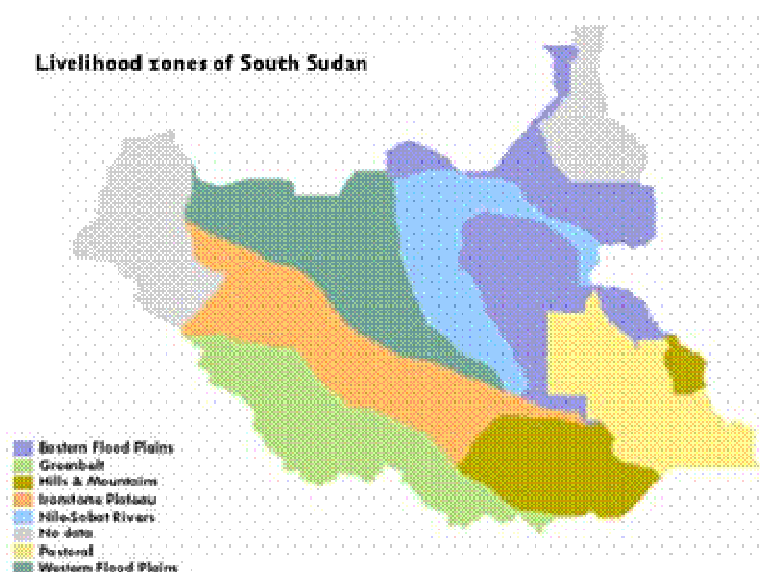


Table 7: Southern Sudan - Characteristics of the different livelihood zones

Livelihood Zone	Characteristics
Greenbelt	Wet area, almost exclusively agricultural surplus production, in dry years increased reliance on root crops and exchange
Arid	Pure pastoralism, seasonal migration in search of water and pasture provide opportunities for trade
Hills and Mountains	Mix of agriculture and pastoralism, reliance of cattle, trade and root crops increased in difficult years
Western Flood Plains	Livestock and agriculture supplemented by fish and wild foods.
Eastern Flood Plains	Similar to the Western Flood plains, but with the additional option of game hunting.
Ironstone Plateau	Depend more heavily on crop production and access the surplus production from the Greenbelt zone
Nile and Sobat Rivers	Wild foods and fish contribute significantly in addition to crops and livestock

5.3 Current food security situation

The household food security analysis incorporated three elements to determine the food security status of households in 2009²⁴:

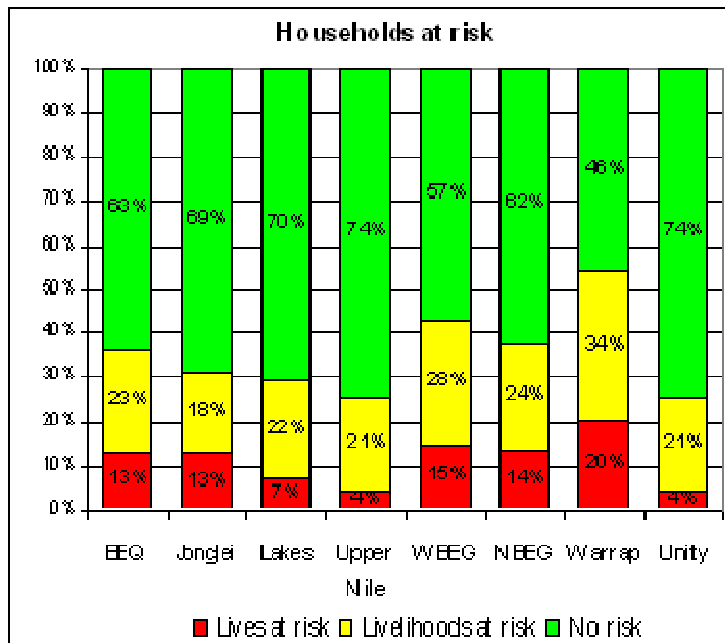
- Food consumption: The quality and variety of the diet consumed by the household.
- Food access: The ability to sustain this consumption and access food in the future.

²⁴ For more details on Household Food Consumption, Food Access and Coping Strategies, and exactly how these were combined into a single measure of Household Food Security, please see Annex 5.

- Coping strategies: The severity and frequency of various Coping Strategies employed by the households.

Together, these three elements were used to classify households in to three categories: Severely food insecure, moderately food insecure and food secure. The outcome of this analysis is shown in Figure 7 below:

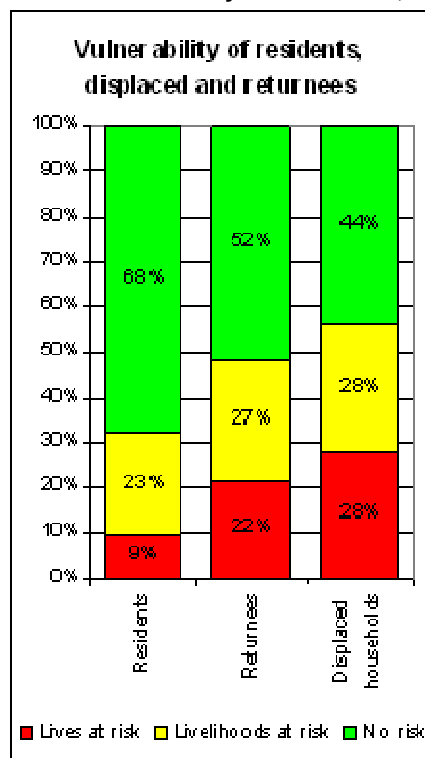
Figure 7: Southern Sudan – Household at risk



The analysis showed there is a general improvement in the livelihoods of most people in South Sudan compared to the previous year. The climatic conditions were generally favorable to crop and livestock production whilst fishing levels increased in lowland areas as the flood waters receded. Nevertheless, amidst these improvements, many households remain vulnerable and food insecure. The state-level synopsis will provide further details of the drivers of food insecurity in each state, but some factors are common across South Sudan:

- People displaced by inter and intra-clan conflicts are even worse off than the returnees, although there are some differences here. The IDPs from Darfur that have mainly settled in Western Bahr El Ghazal (WBEG) are faring much better than people displaced by South Sudan specific conflicts.
- A relatively high proportion of returnees are food insecure (both severe and moderate) compared to residents (see figure below), and areas that receive a lot of returnees are worse off. Not only is this because the returnees themselves are vulnerable, but also because it places a high burden on local communities. Kinship support through sharing of food and other resources negatively impact the food security situation of residents. Reintegration of returnees takes time, and in the meantime many resort to casual labor activities that are common among vulnerable resident households, thereby making already unreliable income sources even more precarious.
- Marital status is clearly linked to vulnerability status. Female-Headed Households are worse off than other households, and particularly this is true of widows and separated females.
- Some areas in the traditional Eastern and Western Floodplains had localized flooding (Jonglei, Upper Nile and Northern Bahr El Ghazal (NBEG)), resulting in the loss of crops and displacement of households.
- There are many areas which are yet to be covered by the social services, which also lack physical infrastructure and accessibility is limited. For instance about 14% of the assessed locations had poor market access and net primary enrollment ratio is also very low. Structural household constraints such as poor infrastructure, low human capital, lack of seeds and tools, low household asset endowment, especially among the poor food consumption group still limit local agricultural production and food access.

Figure 8: Southern Sudan – Vulnerability of residents, displaced and returnees



5.4 Estimated food aid requirements in 2009

After careful analysis of seasonality and potentials for improvement/deterioration of the current situation, it was concluded that the households with severe food insecurity will be in need of food assistance. Households that are moderately food insecure need to be carefully monitored, as they could easily fall into a worse state if they are hit by new shocks. These households will be assisted through non-food humanitarian programmes such as livelihood support from FAO and other UN/NGO agencies.

Table 8 shows the estimated food aid needs for 2009 using a South Sudan total population estimate of 9.7 million. The severity of food assistance was used to estimate the number of people already in South Sudan that are in need of food assistance. In addition, new returnees will be assisted with a three-month ration. The food aid tonnage that will be needed to support these people was calculated based on a response options analysis of different intervention modalities.

Table 8: Southern Sudan - Estimated food assistance requirement in 2009

State	Residents/IDPs in need of food assistance	New returnees 2009 ^{1/}	Total number of people in need of food assistance	Food aid requirement (tonnes)
Eastern Equatoria	95 600	18 100	113 700	8 200
Jonglei	185 400	21 500	206 900	15 700
Lakes	62 200	5 000	67 200	4 900
Upper Nile	28 100	34 000	62 100	4 900
Western Bahr El Ghazal	71 300	3 600	74 900	5 600
Northern Bahr El Ghazal	165 800	98 700	264 500	17 800
Warrap	330 800	30 200	361 000	26 400
Unity	25 800	5 100	30 900	1 900
Central Equatoria	46 200	6 000	52 200	5 000
Western Equatoria	47 700	16 600	64 300	5 700
TOTAL	1 058 900	238 800	1 297 700	96 100

^{1/} IOM/RRR estimates.

AGRICULTURE SITUATION BY ZONE (REGION)

Upper Nile Region: Upper Nile, Unity and Jonglei States

The traditional sector in Upper Nile Region (Upper Nile, Unity and Jonglei States) has been characterized in 2008 by far fewer floods and unlike 2007, when some 90 000 ha were lost, no significant area reductions have been noted or reported to the Mission in 2008. The teams visited **Upper Nile:** Renk, Malakal, Panyikang; **Unity:** Bentiu, Rubkona, Leer, Koch, Guit, Mayom, Pariang and **Jonglei:** Bor, Pibor, Pochalla.

Upper Nile and Unity States form the transition zone between the mechanized farming zones of north Sudan and the traditional hand-cultivated farming systems of the south. In 2008, the Mission was able to visit the main mechanized farming locations in Renk (165 000 ha) and Bentiu (4 000 ha) against a planned 214 000 ha. The area generally accommodates early planted short-cycle sorghum varieties, post-water-logging (late planted), short-cycle red feterita fields, as well as long cycle *agono* sorghum usually sown earlier in the season to be harvested up to December and January.

The tractor forces in Unity and Upper Nile States are expected to be growing and, due to improved security and better road networks more demarcated and un-demarcated farms are likely to have become established, but no details are available in 2008. Mechanized cultivation has been reduced to one pass of discs with a sowing box attached and no seed dressing has been applied in order to reduce costs. Weeding is minimal and is likely to only be conducted on the more promising stands. Production is expected to vary considerably but given that the rains continue and that there is no major *Quelea quelea* bird infestation, overall production of sorghum is expected to be average for the system at around 0.86 tonnes/ha.

No details are available regarding mechanized farming conducted in Melut and Wadkona or in the Shilluk King's fields on the west bank near Malakal or in Mohamed el Jack, the main mechanized farming area near Malakal.

In the traditional sector in **Upper Nile State**, crops in the slightly higher areas and away from the rivers/swamps have probably benefited from good rains, whereas low lying crops are reported to have suffered. The early maturing *leuwarding* and early maize crops have been noted by previous missions to have yielded 1-3 tonnes/ha in Mission spot-check observations, the 2008 combination suggest yields on a par with the conservative levels usually reported. In 2008, general statements of failure connect to flooding in Nasir and Pagak are difficult to reconcile with previous detailed observations and the improved conditions and the NDVI assessments (Figure 1) and crops failing in riverine areas are likely to have been replanted for harvesting later in the year in keeping with the serial nature of harvests in the zone. Villages with crops lost in land locked areas will appear in the locality-based Annual Needs Assessments.

No significant pests or diseases, were noted. However, as in the mechanized sector, the late maturing traditional crops remain subject to *Quelea quelea* attack until harvest time in January. Further along the Sobat corridor recession planting on riverbanks is a traditional farming strategy and is likely to be conducted extensively in the next few weeks when river levels fall.

Regarding **Jonglei State**, without aerial observations further comments are restricted to Mission team visits. Armyworms early in the season were reported as present but rains reduced the significance of the infestation to minimal levels. Local birds required farmers to bird scare on a regular basis. In Bor, Boma and Pochalla, Mission teams estimated sorghum and maize yields at least 2 tonnes/ha. Similar yields were recorded in 2007 and at 1.5-2 tonnes/ha on many farms of 3, 4 and 5 feddans between the two rivers in Akobo. Cattle camps across the vast central Jonglei swampy plain are likely to have been cultivated in 2008 as *less rain* means *more cultivation* in such heavy clay areas.

Market prices are increasing for all commodities including livestock with prices of cattle doubling in Bor in the past year

Livestock is noted to be in good condition with no reports of disease outbreaks, plentiful pasture and water. The only problems connect to cattle raiding and tension between new settlements and graziers.

Regarding **Unity State**, in Bentiu, early crops of maize, the most important cereal in the county, were noted to have benefitted from production conducive rainfall suggesting above normal yields from an increased area

due to the increased planting of far –fields and the agricultural activities of returnees. Production up to 2.3 tonnes/ha recorded by the Mission team in 2007 is commonplace in 2008. Crop losses from affected households in localities across the state from September and October floods are noted, but are not at all comparable to losses noted in 2007. No widespread replanting was noted in 2008 to include riverine fields of sorghum but replanting was noted to be underway or in prospect. Regarding pests and diseases local birds are noted to be the most problematic in 2008.

The opening of oilfields through the nine counties in Unity State is positively affecting work prospects and job opportunities but infrastructure and training need to be improved to allow the population to truly benefit from such advances.

Livestock condition is good due to abundant pasture and water and fewer reported incidents of livestock disease, as is the case throughout the region, livestock prices are increasing. Typical prices over the past year are noted as cows: 1 000-1 500 SP; oxen: 950-100 SP; goats: 110-150 SP; sheep: 150-180 SP; poultry 15-20 SP.

Cereal prices are noted to be higher than in 2007 at sorghum/maize SDG 100/90 kg but falling as the 2008 harvest comes on stream.

Bahr el Ghazal Region: North Bahr el Ghazal, West Bahr el Ghazal, Warrap and Lake States

The Mission visited **Northern Bahr el Ghazal:** Aweil Centre, Aweil East, Aweil West; **Warrap:** Gogrial West; **Western Bahr el Ghazal:** Raja and **Lakes:** Rumbek Central, Rumbek East, Wulu and Cuibet Counties and Cuibet in Lakes.

In **Northern Bahr el Ghazal**, away from the vulnerable areas close to swamps and rivers, although a little late in some areas and not really becoming established until April, the rains have been plentiful and well distributed until September with no significant breaks. Increases in yields and area planted to cereals are noted as a consequence of the rains and due to improved security with more farmers planting larger areas/household, including far fields. Planting of both early short-cycle sorghums and long-cycle sorghums such as *Rabdit* and *Mabior* was accomplished with the farmers' own seed carried over from 2007, or where necessary, borrowed through extended family connections. 2008 has been a migratory pest-free year; however, the usual non-migratory pests are present including local birds, sorghum bug, ants, and stalkborer. Of these only birds are subjects of pest control through continuous bird scaring during daylight hours. Consequently, a sorghum harvest slightly better than in 2007 is expected when spot-check samples taken by the Mission ranged around 1-1.5 tonnes/ha.

In 2008, the organisational difficulties affected the performance of the rice crops in Aweil town seem to have been ameliorated to the extent that area planted has increased by almost 500 percent to 140 ha (336 feddans).

In **West Bahr el Ghazal**, the rains were very favourable and no adverse effects are noted this season. Good crops of sorghum, groundnuts, cassava, sweet potatoes and sesame are expected from an increased area encouraged by improved security, with no significant pest problems except for local birds.

Cassava growing in particular has been noted by previous Mission teams (2005 and 2006) to be on a par with West Equatoria. Two years ago CFSAM sample crop cuts of cassava suggested yields of about 18 tonnes/ha and sorghum yields between 1.5-2 tonnes/ha, in 2008, similar yields are expected.

Raja is the only area in Southern Sudan where traditional irrigation schemes based on *shaduf* may be found working, which is indicative of the high quality farming practices to be found a bicycle ride away from the backyard farming of the urban community that does represent the usual production achieved.

In **Lakes State**, more planting in 2008 enabled farmers to capitalise on the reasonable rainfall, with, subsequently, no major flooding of cereal farms and any flooding that did occur in specific localities, coming after the first harvests were over. Case studies conducted by Mission teams identified an early start to the rains in May but with short breaks in June/July that are not thought to have had significant affects on yields. The reports suggest a better performance than in 2007 consistent with rainfall data patterns of the state and the NDVIs provided by SIFSIA. In Rumbek and Cuibet early-maturing sorghum landraces such as *rapjan* and maize had already been harvested by the time of the Mission. Yields similar to 2007 (measured at 1.7 tonnes/ha) are noted for the main crop sorghums being harvested and are said to have been regularly

achieved. Again, another year without significant pest and disease attacks has not added particular problems so far. The performance of the long maturing landrace *kec* is also expected to be good throughout the zone. Livestock, the most important natural resource in the State are noted to be in good condition throughout due to plentiful pasture and water and a reduction of incidents of livestock diseases.

Market prices are increasing for all commodities except cassava flour.

Equatoria: Central Equatoria, East Equatoria and Western Equatoria States

Central Equatoria: Juba, Yei, Lainya, Morobo, Kejo Keji, Terekeka; **East Equatoria:** Torit, Kapoeta, Ikotos, Magwi; **West Equatoria:** Yambio, Nzara, Ibba, Maridi, Mvolo, Mundri West, Mundri East.

In 2008, Mission visits to all three states was greatly improved by road access, with associated transects, and much longer stays in the States that allowed more counties to be visited and more key-informant interviews/county. The rainfall patterns across the three states shown in Figure 2, by and large confirmed by the field visits, have been highly conducive to crop and pasture production with the exception of poor growth in the south-east ranges of Kapoeta (Figure 1). However, elsewhere in **East Equatoria** all crops were noted to be performing well due to more rain than is usual (see Figure 1) with a very even distribution. Unlike 2007, no lists of flood-affected households have been noted by the Mission in Equatoria and no significant dry-spells were noted.

However, not all security issues are solved. Marauding bands are still reported to be terrorizing isolated farms and cattle-raiding is rife in Ikotos.

Nevertheless, 2008 is a much improved agricultural year with yields throughout the three counties noted to be in the order of 1-2.8 tonnes/ha with no significant pests and diseases. Unfortunately, no further information was obtained in 2008 regarding the worrying spread of fungal diseases in bulrush millet in Lorime, Ikotos which still warrants further investigation as nearly all plants in that location seemed to be affected in 2007.

Pasture and water supply are generally excellent and the market prices of animals are rising providing good terms of trade for the pastoralist majority in East Equatoria. By the same token, government intervention in Torit and Kapoeta county town has provided grain stocks for release to stabilize prices if necessary.

Western Equatoria experienced an early start to the season, which was followed by long, well-distributed rains with no significant dry spells. Planting has been normal covering a wide variety of crops planted in series and as mixed stands. Maize and sorghum yields of 2-3 tonnes/ha are noted by the Mission team but with greatly improved security, except for LRA hit and run areas along the border with Uganda and Congo, labour is very much in demand for all manual work, including farm labouring. Complaints of a rural exodus of the young men to the labour magnet of Juba are noted in all counties; but with prices for clearing, cultivating and weeding (once only) reaching USD 600/ha (SDG 500/feddan), farm labourers are being attracted to Western Equatoria from neighbouring countries. Cassava yields for 3-year crops were sampled and weighed and found to confirm previous estimates that the bitter cassava varieties are producing some 30 tonnes fresh material/ha when harvested at the end of the third year. In the Greenbelt, most well-established farms (*i.e.* not new returnees) are estimated by the Mission to have at least 1 feddan of newly-planted cassava, 1 feddan of second year cassava and 1 feddan of third year cassava within their land occupancy as well as the areas of cereals noted in Table 1. It should be noted that at least two cereal crops are grown in series in one year in the Greenbelt, which stretches from Tambura to Yei, effectively doubling the area under annual cultivation.

Western Equatoria farms have carryover stocks from 2007 and the Farmer Associations confirm both the capability and willingness to produce crops for sale, which is the tradition of the area but long term contracts need to be issued for farmer to risk the investment following the withdrawal of NGO buyers in the recent past, when hundreds of tonnes of maize remained unsold in a climate where maize losses in storage are notoriously high. Storage facilities also need to be improved if marketing strategies are to develop. Exports from the zone are noted to have reached 1 500 tonnes of cassava flour two years ago but no information on direct exports to the Democratic Republic of Congo or the Central African Republic were available in 2008.

In **Central Equatoria**, Mission teams visited Juba, Yei, Lainya, Morobo, Kajo Keji and Terekeka. In allocations, there has been a noticeable increase in planting in all directions. Crop cuts and linked observations indicate sorghum yields around 1.5-3.0 tonnes/ha for both the short cycle landrace *Kelle* and

Lodoka, the tall, longer maturing landrace that makes up the bulk of the crop. Road and river observations suggest widespread planting and well-grown sorghum in the hinterland of Terekeka and a mixture of field presenting all stages of maize crops from emergence to maturity and crops ready for harvest along the riverine areas. Team visits confirmed good crops of groundnuts and sorghum and an overall better season than 2007. However, cattle raiding and tribal clashes are noted in Terekeka. Non-home returning Bor Dinka (2005) is allegedly circulating to reach even Mundri East with negative consequences for peace and security.

Prices in the markets throughout the region, especially in Juba are now dominated by trade with Uganda since the de-mining and re-opening of the Juba–Yei road has created a viable road link estimated to be bringing in maize meal and roots and tubers/year. Information from the Agricultural Bank and Ivory Bank in Juba indicates minimal investment in larger-scale agriculture in 2008. Unless such changes occur that will initiate large-scale farming in Terekeka, Kajo-Keji, Juba and from Tambura to Yei it is likely that the market will depend on imported produce for some time to come, despite policy statements promoting self-sufficiency.

In terms of overall crop performance in the region, the estimates noted in Table 3 suggest that the south is already self-sufficient; however, the style of the production through thousands of disparate units, the infrastructure, communications, organisation and experience to bring the product to the market place does not exist. Therefore, shops and restaurants in Juba sell imported frozen tilapia, beef and lamb and packaged mango juice from Uganda with no competition from local products.

The appalling state of the roads, experienced first hand by the Mission teams working across all the area means that the transport charge of moving 10 tonnes of produce from Yambio to Juba is SDG 3 000. This places a SDG 399 all raw materials emanating from West Equatoria that makes them uncompetitive. An absence of grinding mills (maize to maize flour) or processing plants (fresh cassava to tapioca/gari) that might add value to the products compounds the problem.

FOOD SECURITY CONTEXT AND PROSPECTS FOR 2009, BY STATE

Jonglei

Jonglei State comprises eleven counties namely: Korfulus, Nyirol, Wuror, Ayod, Fangak, Duk, Twic East, Bor South, Pibor, Akobo and Pochalla. It borders Lakes and Unity to the west, Upper Nile to the North, Ethiopia to the east, Central and Eastern Equatoria to the south. Western and Northern border of the state are within the Nile Sobat river livelihood zones while the central and Southern parts lie within Eastern flood plain, Pastoral, Hills and Mountains zones respectively. The population is a mixture of agro-pastoralists and sedentary agricultural communities. Generally, the community is capable of surplus food production. Majority of Households depend on livestock, sorghum, wild foods and fish as their main food sources. Inter-clan conflicts and floods have combined to create a precarious food security situation in the state.

Although widespread poverty persists in most parts of the state some progress has been made towards recovery, albeit slow due to general low household asset endowment and poor infrastructure. Rainfall this season was average to fairly above average causing floods in many parts of the state. Heavy rains and flooding in Lankien and Pieri increased the incidence of livestock diseases and mortality. As a result most of the cattle were moved to higher grounds. Localized floods were also reported in Ayod, Twic, and Duk counties and also in Nyirol counties in July during the first harvest, which was severely damaged.

The main markets in the area include: Bor, Lankien and Pieri. Trade and income generating activities such as petty trade and labour to purchase food has become increasingly important. Market access has improved significantly due to free movement which has in turn improved trade and income options since the signing of peace agreement in 2005. The upgrading of Juba-Bor road by GTZ/WFP has boosted food availability in Bor and Mabior and the market prices of cereals and other commodities are stable.

Major sources of income include: sale of livestock and petty trade such as brewing and tea making, tobacco, fish and labour sales cutting across all the sectors.

In general, the overall crop performance in some parts of greater Bor counties was favourable in the areas unaffected by floods and vegetation development was above average throughout the state. In 2007 Jonglei was affected profoundly by widespread insecurity for the later half of the year, which caused displacement and restricted movements and consequently reducing food access. It was observed that as a result of the prevalent insecurity households were unable to cope with flooding which essentially has become a part of their life in the state. Pockets of extreme vulnerability were observed in Lankien, Pieri, Motot, Nyirol and Wuror which was driven mainly by insecurity (caused by inter-clan fighting and cattle raiding) and worsened by the floods.

As a result about 145 800 vulnerable residents will need about 7 200 tonnes of food in 2008. In addition, it is estimated that about 39 000 returnees could come back to state in 2009.

Upper Nile

Upper Nile State comprises of twelve counties namely, Renk, Manyo, Malut, Maban, Fashoda, Baliet, Malakal, Ulang, Panyikango, Nasir, Longchok and Maiwut. It borders White Nile State to the north, Blue Nile state and Ethiopia to the east, South Kordofan and Unity to the west and Jonglei to the south.

Agriculturally, the soils comprise mainly of vertisols, or black cotton soils and the length of growing period is about 120 days. On the eastern side around Latjor, the soils are deep, fertile and loamy in consistency. In addition to rain-fed farming, agricultural production is dependent on recessional farming in the seasonally flooded areas. Livestock and fish production also plays a significant role in the food economy. The state is endowed with a network of rivers which is an important source of livelihood through fishing activities. Owing to the flat terrain and dense rivers network, the state is prone to flooding.

Like most states in Southern Sudan, the state is recovering from the destruction of livelihoods during the protracted civil war but vast areas lack physical infrastructure and accessibility is quite limited over extensive areas and social facilities are also limited.

The rainfall in most of Upper Nile was above average. The above-average rains in July caused localized flooding reported in Renk, Longochok, Maiwut, and Nasir counties. The inundation affected short-term food availability expected from the early harvest in August, market access and trade activities.

However, the price of sorghum in Malakal remained relatively stable between SDG 55-60 for 90 kg of sorghum (compared to SDG 80 same time in 2007). After the floods, fish availability is expected to improve which may offset the short-term decline in food availability caused by the floods. Field reports indicated that local torrential rains in the Shilluk area also caused inundation along the riverine areas of the White Nile and Sobat rivers.

A nutrition survey conducted by ACF in Renk in October 2007 estimated a GAM rate of 17.7 percent among the IDPs and GAM of 13.9 percent for the residents. The differential GAM rate was attributed mainly to the effects of flooding. The malnutrition among the IDPs may be attributed to disease, poor water quality, sanitation and hygiene factors, inadequate care practices and disrupted livelihoods.

Upper Nile has witnessed a very high number of returnees that were displaced during the civil war. The influx of returnees is expected to continue in 2008. Owing mainly to effects of flooding and isolated insecurity, it is estimated that about 109 400 will be at risk of food insecurity requiring about 11 200 tonnes. In addition, an estimated figure of about 17 500 returnees is projected to return to the state in 2009.

Western Bahr El Ghazal

Western Bahr el Ghazal State, in the north-western part of Southern Sudan, borders Chad to the west, Western Equatoria to the south, Warrap and Northern Bahr el Ghazal to the east and Darfur to the North. It comprises of three counties; Wau, Raga and Jur River. It lies predominantly on the ironstone livelihood zone while the northern and southern tips covered by western flood plains and green belt zones respectively.

Agriculture and some limited livestock keeping (due to the presence of tsetse fly) are the main livelihood activities for the resident population. Sorghum, sesame and groundnuts are the main crops produced in the state. The community is capable of surplus food production given the historical background of mechanized farming in the area. Majority of households depend on sorghum, honey collection, wild foods and fish as their main food sources.

Widespread poverty is still significant in the area due to the presence of returnees especially in the urban areas who have not moved to their homes of origin. Rainfall this season was fairly above normal and the vegetation development is above average.

Trade and income generating activities such as petty trade and labour to purchase food has continued to be an important component in the household livelihoods. Market access has improved significantly with Wau being the main market in the state. Most households are moderately food secure. However, 109 000 vulnerable residents are likely to be food insecure and will require 5 300 tonnes. In addition, it is estimated that about 36 000 returnees expected to return in 2009.

Northern Bahr El Ghazal

Northern Bahr el Ghazal comprises of five counties namely, Aweil South, Aweil North, Aweil Centre, Aweil West and Aweil East. It borders Western Bahr el Ghazal to the west and south, Warrap to the east, South Darfur to the north-west and Western Kordofan to the north-east. The state has over the last two decades experienced severe erosion of its livelihood systems. The decline in the people's livelihoods was mainly due to the civil war which displaced, maimed and killed many of the people.

The state was disproportionately affected owing its position in the frontline. Besides the conflict, erratic rains and poor soils have combined to create a recurrent food security crisis in most parts of the state and a situation of structural poverty prevails. Since the signing of the peace agreement in January 2005, relative peace and stability has prevailed and the people have been able to concentrate on recovery and development activities. The economic recovery efforts are seen in reconstruction of markets, rehabilitation of trunk roads and expansion of agriculture especially to areas that were previously suspected to have been mined. Although some progress has been made towards economic recovery, the progress has been slow due to general poverty and lack of adequate assets and poor infrastructure.

Erratic rainfall almost every year manifested itself, in recent years had been consistently between near normal to below normal. This has led to persistent crop failures and general erosion of livelihoods. Soils are free draining sandy loams with very poor water retention capacity. This has not been conducive for the major crop sorghum (long season sorghum). Consequently below expectation yield rates are a common feature of agricultural production in Northern Bahr el Ghazal.

Livestock production contributes significantly towards food and income among the majority of the agro-pastoral households. Livestock production was however severely disrupted during the protracted civil war in Southern Sudan and many households are restocking. Major constraints particularly diseases and lack of modern management practices limit herd productivity.

Trade and marketing has increased due to improved security. Manufactured goods and food products come in from the northern states and from Western, Central Equatoria and Western Bahr el Ghazal. Most livestock are sold to the northern traders. Livestock prices have significantly improved due to increased restocking and opening of trade routes. Rehabilitation of trunk roads linking Northern Bahr el Ghazal with other states has also improved transportation for goods within and between the states.

The results of the 2007 ANLA reveal that security has highly improved in the state and rainfall was favourable at the start of the season in 2007. These encouraged farmers to increase area under cultivation although the farmers' efforts were diminished by floods later in the season, *Striga* weed affecting sorghum the main crop and effect on livestock caused due to water logging, which affect agricultural production.

It is estimated that about 122 900 people will need 13 600 tonnes of food in 2008 in Northern Bahr el Ghazal. In addition, it is projected that about 38 769 returnees will come back to the state in 2009.

Warrap

Warrap State is administratively divided into six counties: Twic, Gogrial East, Gogrial West, Tonj East, Tonj North and Tonj South. It is bordered by South Kordofan in the north, Western Bahr El Ghazal in the west, Western Equatoria in the south, Lakes and Unity to the east. Although the area has a high potential for agriculture, livestock remains a significant source of livelihoods.

General security situation in 2007 has been stable with some isolated cases of localized inter-clan conflicts which occurred during the second quarter of 2007. Rudimentary agricultural production system remains predominant, basic local hand-made tools such as *maloda* are still used by the majority of households. Cultivated area and crop diversification remains low with farmers using low quality seeds. Pests, diseases and weeds reported in most parts of the State to inhibit good crop yields.

Increased returns of displaced persons, coupled with rural-urban migration, is becoming a major concern in some towns such as Kuajok, Alek, Turalei and Tonj, because of the likelihood that services could be overstretched in the locations.

Due to improved infrastructure flow of goods and services have significantly had a positive effect on the community. However, accessibility to the rural areas is still a problem due to poor road conditions especially during the rainy season.

About 304 200 vulnerable people will need 13 300 tonnes of food aid to meet their food needs in 2008. In addition, it is projected that about 10 000 would return to the state in 2009.

Unity

Administratively, Unity State consists of nine counties: Pariang, Mayom, Abiemnhom, Rubkona, Guit, Koch, Mayendit, Leer and Panyijar. It borders Abyei and South Kordofan to the north, Upper Nile and Jonglei to the east, Lakes to the south and Warrap to the west, which are further divided into 56 payams.

Western part of the state is within the Western flood plains while the eastern part of the state lies within the Nile Sobat river livelihood zones. The livelihood is a mixture of agro-pastoralism fishing and some sedentary agriculture towards the southern parts of Nyal and Ganyiel (main crops being maize, sorghum and groundnuts). However, the opening up of the oil fields (in northern parts of the state) has opened up a broader range of income opportunities.

Rainfall this season was above average but the prospects for a good crop in 2008 were hindered by the

extensive August–October floods, which occurred in Tam, Mayom, Ruweng and Wankai payams of Mayom as well as in Guit and Rubkona counties. Flooding reduced crop performance creating a potentially precarious food security situation as well as increased incidence of human and livestock diseases. On the other hand, it provided opportunity for recessional farming and increased fish availability, which may to some extent, offset some of the negative effects of the extensive floods.

Some substantial progress has been made towards recovery, albeit slow due to general low household asset endowment and poor infrastructure and poverty remains significant in most households.

The main markets in the area include Bentiu and Leer. Trade and income generating activities such as petty trade and labour to the oil fields to purchase food has become increasingly important. Market access has improved significantly due to free movement which has in turn improved trade and income options. Prices have been reported to be stable compared to the same time in 2007 one sack: 90 kg of sorghum selling at SDG 120 in the market.

Major sources of income include: sale of cereals among the poor food consumption group, brewing in the borderline group and labour in the good household group. Livestock and petty trade (such as tea making), fish and firewood/charcoal sales cut across all the food consumption groups.

Although relative peace prevails in the area, some of the households are food insecure due to the recent floods that affected the area. Therefore about 73 100 vulnerable residents will need about 4 900 tonnes of food in 2008. In addition, about 10 600 returnees are expected to come back to the state in 2008.

Lakes State

Lakes State is comprised of Rumbek Central, Rumbek East, Rumbek North, Yirol East, Yirol West, Cueibet, Awerial and Wulu. The northern and eastern parts of Lakes State form part of the western flood plains livelihood zone where the population is primarily agro-pastoral although the dependence on fishing and wild foods is also significant. The south-western part of State forms part of the Ironstone Plateau Livelihood Zone where crop cultivation, wild plant and honey collection, and game hunting are the main food sources. This gives the State a highly diversified farming system where crop and livestock production play almost equal roles in the food economy. Fishing also plays an important role due to the presence of many rivers and lakes.

Late onset of rainfall was reported in most parts of the State but there are no indications that this affected agricultural performance significantly. Localized flooding was reported in Cuiebet and Yirol and counties.

Lakes State is extremely dependent on external market, mainly Uganda and disruptions on the Rumbek-Koboko road could adversely affect the supply of manufactured goods and food products. During the rainy season the road was closed because of poor road condition, which was quickly evident in increased market prices and reduced commodity stocks.

Livestock is an important component of the populations' livelihood and livestock population in the State is among the highest in Southern Sudan. Vegetation development was normal and no major security incidents affecting agriculture were reported. The livestock body condition is good because of abundant pasture and water.

Despite the suitable conditions, due to low household asset endowment and other chronic poverty factors it is estimated that 87 200 vulnerable residents would require about 4 200 tonnes to support livelihood recovery in the areas affected by floods as well as support development activities such as school construction, school feeding, asset creation and training. In addition, about 2 500 returnees are expected in the state.

Central Equatoria (Bahr el Jabel) State

Central Equatoria State is now divided into – Juba, Yei River, Morobo, Lainya, Kajokeji, and Terekeka counties. It includes the Greenbelt livelihood zone to the west, Ironstone plateau and the Hills and Mountains livelihood zones to the north and east respectively.

No major insecurity was reported in 2007 and rainfall was above average in most parts of the state. No migratory pests and diseases were reported but the substantial prevalence of *Striga* in Yei, Kajo Keji, Lainya

and Morobo Counties is a serious concern. While there is a high demand of tools and seeds but there seems to be very low availability of these inputs in the market.

In 2009, a high influx of people is expected from the neighbouring countries and without the supply of tools and seeds in the market; scarcity of seeds and tools will continue to be a pressing constraint for farmers in Central Equatoria. The options for addressing this labour constraint are mechanization and increased use of ox-ploughs.

Therefore, there is need for a deliberate effort by the GOSS in this area to improve availability of agricultural inputs through credit facilities, revolving funds and also by strengthening co-operative associations and other self-help groups. Micro-finance credit is available but it is orientated towards supporting small-business entrepreneurship.

With increased urbanization of major centres such as Juba, Yei and their environs there is a significant rural-urban migration of active labour, which may also affect agricultural production. In addition, there is also an upsurge of activities such as charcoal and brick making that are likely to have serious environmental consequences. These need to be addressed sustainably.

Economically, Central Equatoria (particularly Juba) relies mainly on the Uganda market to meet its needs for manufactured goods, processed foods, grains as well as fresh fruits and vegetables. The state is relatively well served with good road networks and there is easier movement of people and goods in Central Equatoria compared to other states which may be a reason why there is a high influx of returnees throughout the state.

Because of the plenty socio-economic opportunities, food-based assistance of about 1 115 tonnes for an estimated 32 514 beneficiaries is recommended exclusively for development activities, training and school feeding. The main challenge is likely to be that of returnees. It is estimated that about 128 000 returnees will come back from the neighbouring countries.

East Equatoria State

East Equatoria State encompasses the counties of Budi, Ikotos, Kapoeta East, Kapoeta North, Kapoeta South, Lopa, Magwi, and Torit. The western part of the State lies in the Hills and Mountains Livelihood Zone which is characterised by mountains, plains and valleys, which provide a variety of strategies for its residents to cope with drought and flood conditions. Mixed seasons (two seasons in the highlands and one in the lowlands) enable rural households to minimize the risks associated with agro-climatic variations and crop failures. In the highlands, the first season is from April to July and the second from September to December.

The plains have one growing season, from April to July. Most households tend to cultivate and keep livestock in both the hills and plains. The eastern part of the state lies in the Arid Livelihood Zone, which occupies the south-eastern tip of Southern Sudan. Here, households practice a nearly pure form of pastoralism and there is almost exclusive reliance on livestock and livestock trade for food. Seasonal migrations in search of both water and pasture provide opportunities for substantial trade and exchange with neighbouring communities.

The rainfall in most of Eastern Equatoria was above average and it resulted in vegetation development than the last three years. In the relatively drier adjoining areas such as Lokichoggio, sorghum was cultivated for the first time in nearly four years because of the favourable rainfall pattern. Similarly an increase in pasture biomass and water availability connects to increased livestock productivity in terms of herd growth, meat and milk production.

In view of the much-improved prospect of food production in the state, there is a reduction in the number of beneficiaries from 152 000 to 108 000 and food needs from 8 000 tonnes to 6 442 tonnes which will be focused on recovery and development activities. In addition it is projected about 24 126 returnees will come back to the state.

West Equatoria State

Western Equatoria State is composed of 10 counties, namely Yambio, Nzara, Ezo, Tambura, Nagero, Iba, Maridi, Mundri West, Mundri East and Mvolo. The State lies in the Greenbelt Livelihood Zone and households rely almost exclusively on agriculture to meet their food needs. With seasonal rainfall reaching 1 400 mm and more, it is the rainiest region in Sudan and enjoys a very long growing period (March to

December) and has a very wide diversity of crops and multiple cropping cycles. Here, surplus production is common and households cope with dry years by increasing their dependence on root crops and exchange.

Although it is reported that the rains delayed, the rainfall in June and July was above average in many locations and no significant change in yield occurred. However, there is a chronic lack of tools, which is likely to intensify with the increased returnee influx expected in 2009.

In general, the price of cassava increased from SDG 2.2 for 8 kg bucket to about SDG 6. But in Tambura the price of sorghum at SDG 15 for 10 kg is much higher than the price in Juba at SDG 10. This is attributed to the increased demand imposed by returnees from Central African Republic and Democratic Republic of Congo. This seems to be a much-localized phenomenon, which is unlikely to upset the relatively stable food security situation in Tambura.

The security situation was calm in 2008 and no LRA attacks were reported throughout the state with the exception of the recurrent tribal conflicts between the Jur and Dinka in Mvolo area.

As a result in Western Equatoria, food assistance will be focused on 20 000 conflict-affected vulnerable residents of Mvolo amounting to about 1 000 tonnes and returnees. It is estimated that about 67 000 returnees will be coming back from Khartoum, neighbouring countries of Uganda, Democratic Republic of Congo and Central African Republic.

SOUTHERN SUDAN CROP CALENDAR

CROP	J	F	M	A	M	J	J	A	S	O	N	D	
SORGHUM													
<i>cham</i>					S	X	X	H	H				Bahr el Ghazal
<i>alep cham</i>						S	X	X	X	H			
<i>rapjung</i>					S	X	X	X	H				
<i>nanjung</i>					S	X	X	X	H				
<i>nyethin</i>						S	X	X	X	H			
<i>rabdit</i>						S	X	X	X	H			
<i>nyandok</i>						S	X	X	X	H			
<i>abele</i>						S	X	X	X	H			
<i>aleul</i>						S	X	X	X	H			
<i>mabior</i>						S	X	X	X	H			
<i>aiyella</i>						S	X	X	X	H			Lakes
<i>kec</i>						S	X	X	X	X	H	H	
<i>lewalding</i>					S	X	X	H	H				Upper Nile
<i>agono</i>						S	X	X	X	X	H	H	
<i>ossingo</i>					S	X	X	H	H				East Equatoria
<i>atari</i>						S	X	X	X	H			Ikotos
<i>kelle</i>					S	X	X	H	H				Gen Equatoria
<i>ladoka</i>						S	X	X	X	H			Gen Equatoria
Serena s. var.	X	H					S	X	X	H	S	X	West Equatoria
OTHER CROPS													
p millet						X	X	X	X	X			All north
maize n.					S	X	X	H	H				All north-back yd
maize	X	X	H				S	X	X	H	S	X	Sobat
maize s.			S	X	X	H	S	X	X	H	S	X	West Equatoria
groundnut (2 vars)	H				S	X	X	H		S	X	X	South North
					S	X	X	H					
f millet					S	X	X	X	X	H	H		
cassava	x	x	x	x	X	S/H	S/H	x	x	x	x	x	Wau and South
rice paddy						S	X	X	X	H			West Equatoria
rice upland		S	X	X	X	H		S	X	X	X	H	West Equatoria
sesame						S	X	X	X	H			All over
pumpkin			H	H	H			S					Wau and north
sowpeas							S	X	X	H			Bahr el Ghazal

S = Sow; H = Harvest

STATE LEVEL FOOD SECURITY SYNOPSIS

1. Warrap, Northern Bahr el Ghazal (NBEG), Western Bahr el Ghazal (WBEG) and Lakes

The **Warrap, Northern Bahr el Ghazal** and **Western Bahr el Ghazal States** are located in the Ironstone Plateau on the South and Western Flood Plains on the North. Agriculture and livestock production are the main livelihood activities. These livelihood activities are supplemented by River Jur which provides ample fishing grounds during rainy season as well as casual labour and petty trade. The road network from Wau to Abyei via Wunroc makes some parts of the state accessible, hence improving trade activities.

Security has improved considerably since the signing of the Comprehensive Peace Agreement (CPA). Similar to other states in South Sudan, Warrap, Northern Bahr el Ghazal, and Western Bahr el Ghazal are gradually recovering from the impact of more than two decades of civil war.

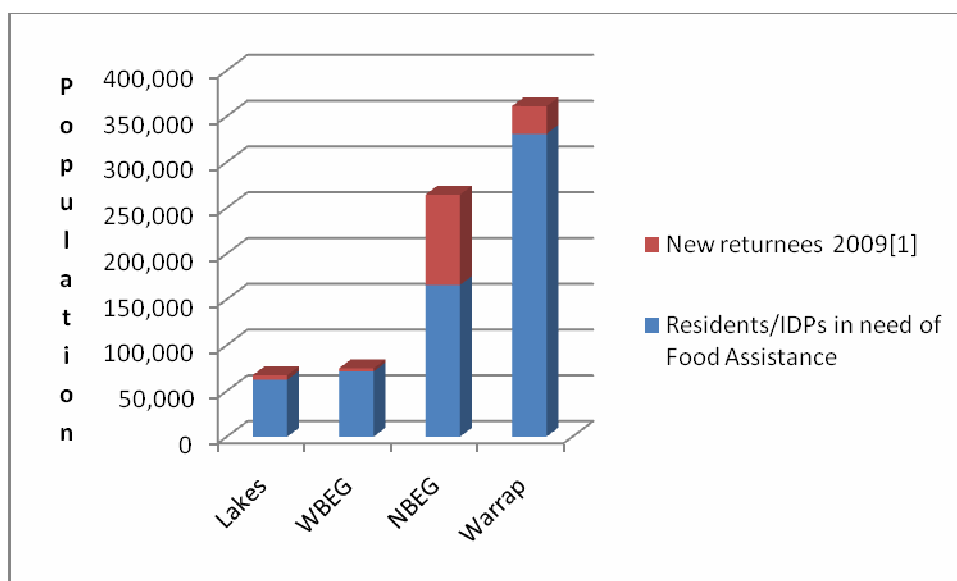
With the relative peace, there has been increased development oriented activities in these states. Market construction has scaled up as more and more local entrepreneurs are establishing and/or expanding businesses as a result of improved security. Manufactured goods and food products come in from the northern states and from western, Central Equatoria and Western Bahr el Ghazal. Most livestock are sold to the Northern traders. Rehabilitation of trunk roads linking Northern Bahr el Ghazal, Warrap and with other states has also improved transportation of goods.

Although security and accessibility have generally improved, localized inter-clan conflicts and the Abyei conflict (affecting households particularly in Aweil East and Twic) have undermined communities' ongoing efforts to reestablish their disrupted livelihood systems and improve household asset holdings. Furthermore, the increase of returnees and IDPs (Abieye, Dinka Agwok and Apuk) has placed additional pressure on already constrained livelihood systems used to access food, basic services, and infrastructure. Furthermore, severe flooding in the lowlands and labour availability (for poor and middle socio-economic groups) decreased own crop production, resulting in a major impact on households that do not have alternative reliable and sustainable sources of food and income.

The main source of livelihood in Warrap and NBEG States is agro-pastoralist, subsistence farming and other activities such as casual labour and petty trade, which involves sale of grass, small food items and local brews. Livelihood groups relying primarily on casual labour and petty trade (grass, charcoal and grass sales) have limited access to food and income and at the time of the assessment were relying on a variety of coping mechanisms to meet household needs. These households utilize relatively higher proportion of their income on food. This group also includes subsistence farmers with limited or no access to other income generating activities such as livestock, salaried work and/or trade.

With the exception of Jur River County, Western Bahr el Ghazal household have increased own production and improved access to food and income. Factors linked to vulnerability in Jur River County are similar to households in Northern Bahr el Ghazal and Warrap.

Northern and eastern parts of **Lakes State** form part of the Western Flood Plains Livelihood Zone where the population is primarily ago-pastoral. Livestock keeping is a very important component of the populations' livelihood and livestock population in the State is among the highest in southern Sudan. Relative peace prevailing in the region has led to a continued influx of returnees which has exacerbated the pressure on the existing food stocks. Trade has significantly expanded with the opening of new roads especially during dry season. Main markets serving the area include Wau, Warawar and Yei among others. During wet season, poor road conditions hamper access to markets, though, during dry season it extends as far as Northern Sudan and neighbouring countries such as Uganda. Lakes State is extremely dependent on external market, mainly Uganda. Disruptions on the Rumbek-Koboko road could adversely affect the supply of manufactured goods and food products. During the rainy season, road closures resulted in increased market prices and reduced commodity stocks.



[1] IOM/RRR estimates.

It is estimated that about 767 600 people will need 54 700 tonnes of food in 2009 in Northern Bahr el Ghazal, Western Bahr el Ghazal, Warrap and Lakes.

2. Jonglei, Uppernile and Unity States

Jonglei State lies within Eastern flood plain, Pastoral, Hills and Mountains zones respectively, and therefore the population is a mixture of agro-pastoralists and agricultural communities. While the State is potentially food secure, continued local insecurity as well as floods has generally affected the livelihoods of the communities. Generally, the community is capable of surplus food production. Most households depend on livestock, crop production, casual labour and fishing for their livelihood.

The main markets of Bor, Lankien and Pieri have provided the most needed foods and other supplies for the communities. With the improvements of the road infrastructure between Juba, Bor and Mabior, increased volumes of trade in different commodities including cereals have increased. This has also increased the opportunities for trade in these local communities and thereby improving income earning opportunities. As was in 2008, the major sources of income have consistently been the sale of livestock and petty trade such as brewing, tobacco, fish and labor sales.

Crop performance was normal, with the exception of areas that received above normal flooding (Baidit and Makuach payams, Bor County). The floods in these areas lasted for five months (August to December).

Localized conflicts associated with cattle raids, interclan/tribe conflicts and banditry in especially in Duk, Wuror, and Nyirol counties occurred sporadically. This prevented many households within these areas from cultivation, but the general overall security situation in the state was good.

Agriculture and livestock production play significant roles in the food security of both Upper Nile and Unity. With both States endowed with a network of rivers, fishing is also a very important livelihood activity. Owing to the flat terrain and dense river network, the two states are prone to flooding. The majority of households in both States are food secure.

Like most states in Southern Sudan, Upper Nile state is recovering from the destruction of livelihoods during the protracted civil war but vast areas lack physical infrastructure and accessibility is quite limited. Upper Nile has witnessed a very high number of returnees over the years and since the signing of the CPA. The influx of returnees is expected to continue in 2009.

Better-off groups have access to boats and fishing equipment resulting in a higher reliance on fish sales and consumption at the time of the assessment. Households within this group market purchases and as well as own production. Poor households rely on petty trade, casual labour and own crop production. Fish consumption will improve for this group as the water recedes. Flooding resulting in reduced crop production. A limited number of Some of the poor households (Residents, returnees and IDPs) are not able fill this gap through fishing, petty trade and casual labour.

Unity state is generally food secure. Climatically it is categorized as sub tropical and falling within Western flood plains in the west and Nile Sobat River in the eastern livelihood zones. Livelihoods in this state are composed of agro-pastoralism, fishing and some sedentary (settled) agriculture in the southern parts of the state especially Nyal, Ganyiel and the surrounding areas. Due to improved infrastructure flow of goods and services have significantly had a positive effect on the community. However, accessibility to the rural areas is still a problem due to poor road conditions especially during the rainy season making the general prices of commodities to be high.

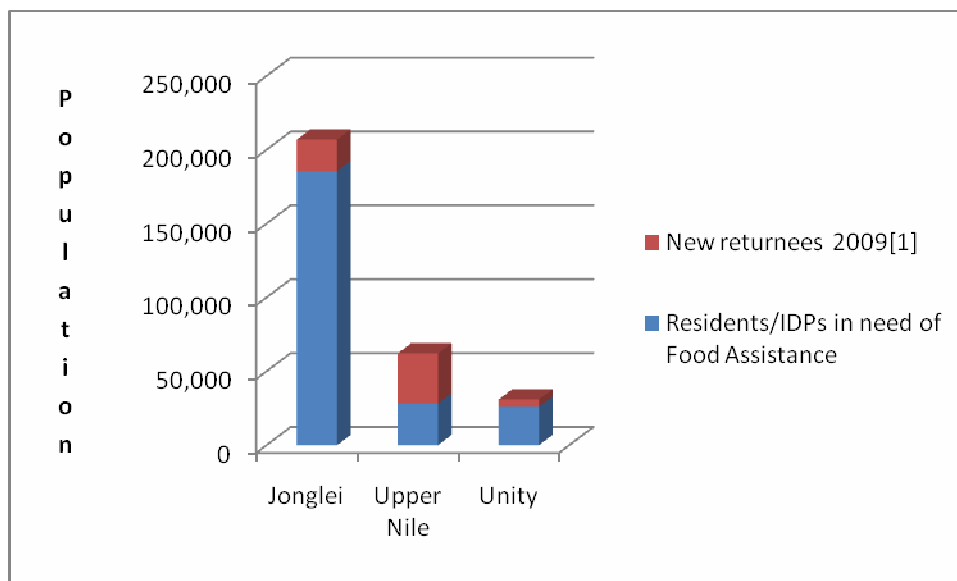
Assessment findings reveal that rainfall this year was above average and good returns expected suggesting stable food security situation in the next season as opposed to last year when floods extensively destroyed crops between the months of August and October.

Generally, security situation in 2008 has been stable save for some isolated cases of localized inter-clan conflicts which is normal in the state. Increased returns of displaced persons (during the war), coupled with rural-urban migration, is becoming a major concern in some towns such as Bentiu, Rukona, Abiemnhom and Guit, because of the likelihood that services could be overstretched in the affected locations.

Trade and income generating activities such as petty trade and labor to the oil firms have increased significantly. Other sources of income include sale of cereals, firewood/charcoal sales, fishing sales, brewing, and casual labour.

Returnees and resident households petty trade and casual labour are amongst food insecure in these States. These households have not cultivated and have limited access to fishing equipment or other productive assets.

It is estimated that about 299 900 people will need 22 500 tonnes of food in 2009 in Jonglei, Unity and Upper Nile States.



[1] IOM/RRR estimates.

3. Eastern, Western and Central Equatoria States

Eastern Equatoria resides in the arid pastoral zone. Food insecure households include returnees and households that rely on own crop production and casual labour. Decreased crop production, sharing resources amongst returnee and residents and increased competition the limited labour opportunities have negatively affected counties within the state with high number of returnees.

The Western and Central Equatoria States are generally food secure. Western Equatoria lies in the Greenbelt and Hills and Mountain Livelihood Zones and households rely almost exclusively on agriculture (main livelihood activity) to meet their food needs (see Figure). Households within the Hills and Mountain sections of Central Equatoria also rely on livestock production. Western Equatoria is capable of producing some surplus food if all the factors are constant. With seasonal rainfall reaching 1400 mm and more, it is the

rainiest region in Sudan and enjoys a very long growing period (March to December) and has a very wide diversity of crops and multiple cropping cycles. The main determinants of food security in this state are rainfall (amounts and patterns), security and market access. The demand for food resources within the region will increase with the Food resources within region with the continued arrival of refugees from democratic Republic of Congo and IDPs.

It is estimated that about 113 700 people will need 8 200 tonnes of food in 2009 in Eastern Equatoria. An additional, 116 500 people (mainly returnees, IDPs and refugees) will require 10 700 tonnes in Western and Central Equatoria. Food aid needs in Central and Western Equatoria were estimated based on secondary data and ongoing WFP programme monitoring information.

FOOD SECURITY ANALYSIS

1. Analysis of food consumption

The foundation for any food security analysis in WFP is food consumption data. The diversity and frequency of household food consumption were established by gathering information about eating habits in the one week preceding the assessment. A Food Consumption Score was then constructed that incorporates both the dietary diversity, frequency of consumption, and nutritional value of different food groups. Based on this score, a household can be classified as having poor, borderline or acceptable consumption ^{1/}.

2. Food access indicators

Food consumption is alone unable to explain the complexities of household level food security, due to its short recall period and singular focus on eating habits. The sustainability to of this food consumption status has to be assessed by looking at a household's ability to access food in the future.

An analytical process was follow by which a wealth of data was explored to find context-specific indicators of food access. The analysis employed state level aggregation to ensure that context sensitive vulnerability indicators were not hidden by national averages. In the end, two indicators were chosen:

a. Reliability and sustainability of income sources

Survey data on the three main income sources was analyzed to categorize households as having poor, medium or good sources in terms of reliability and sustainability. This was done through several steps:

- i. Each of the potential income sources were categorized as good (4), medium (2) or poor (1).
- ii. For each household, the rating of the three sources were summed to come up with a final income source rating. No source equals a rating of 0.

Example:

	Type of source	Rating
Main source	Sale of cereals	4
Second source	Grass sales	1
Third source	None	0
	Total rating	5

- iii. The total rating now incorporates both the type of sources, and the number of sources.
- iv. This total rating was then split in three categories after careful analysis of the meaning of the score. A score of 0-3 was categorized as poor, 4-5 as medium, and 6-9 as good.

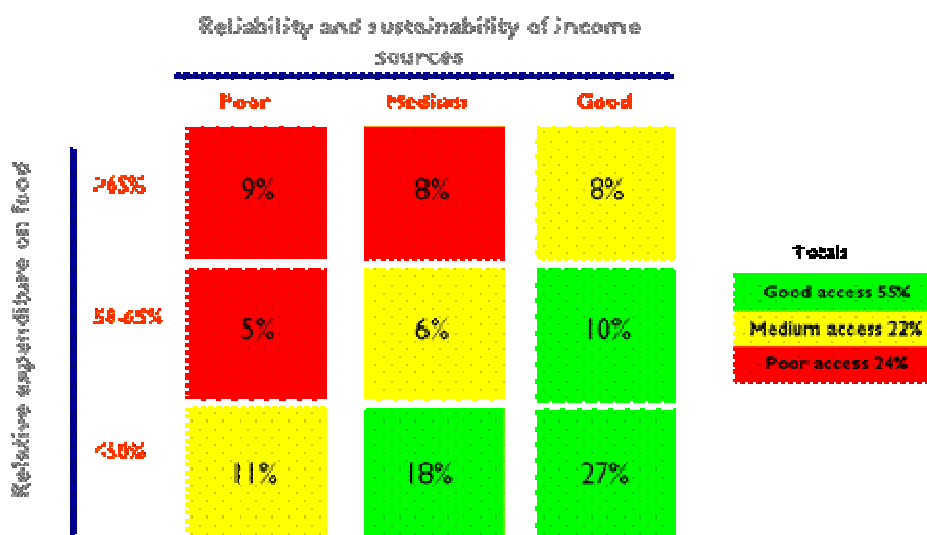
b. Relative expenditure on food:

Relative expenditure on food is one of the core indicators of food security. Households that spend most of their income on food have generally little income and they do so at the expense of other essential posts, such as non-food items, clothes and education. The below categorization was used for this indicator.

^{1/} For more information, validation of the indicator as a proxy of food security, and discussion of these thresholds, please refer to the Food Consumption Score Technical Guidance Sheet, WFP Vulnerability Analysis and Mapping Branch (January 2008).

Relative expenditure on food		
>65%	50-65%	<50%
Poor	Medium	Good

The two access indicators from step 2 were then consolidated into one measure of food access through a simple cross tabulation as shown below.



3. Food security status profiling

To help with response options analysis and see which groups are most vulnerable and would be in need of external assistance, a third dimension was added: Coping Strategies. Qualitative analysis from Focus Group Discussions revealed which coping strategies that were a sign of severe stress. This was combined with the household data on how often each coping strategy was employed. Together, the severity and frequency was combined to assign each household a Coping Strategies Index (CSI) ^{1/}.

- Thus, in this a high CSI indicates severe stress and the use of negative coping strategies that will undermine a households' ability to fend for itself the future, or in extreme cases it will even put lives at risk.

Furthermore, our three dimensions (consumption, access and coping) were combined to see which households are food insecure. 3 categories of people were identified:

- Severely food insecure
- Moderately food insecure
- Food Secure

^{1/} Coping Strategies that were rated very differently in terms of severity in various regions of South Sudan were excluded for this analysis. These are obviously context-specific and cannot be used in a uniform way in a common index with common thresholds. An example is to migrate in search for food or work. This is common in some parts of South Sudan, while it is a sign of severe stress other places.

Food Consumption

Poor Borderline Acceptable

Ability to access food	Poor	Coping Strategies Index	High	0%	0%	1%
			Medium	1%	1%	1%
			Low	4%	4%	8%
	Medium	Coping Strategies Index	High	0%	0%	1%
			Medium	1%	1%	2%
			Low	3%	4%	13%
	Good	Coping Strategies Index	High	0%	0%	2%
			Medium	1%	2%	4%
			Low	5%	10%	31%

Totals

Severely food insecure	11%
Moderately food insecure	23%
Food secure	66%