

SPECIAL REPORT

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

21 January 2008



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME



WORLD FOOD PROGRAMME, ROME

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Mission Highlights

- Floods and waterlogging in parts of Southern Sudan during the May-December 2007 period have affected some 56 000 hectares of crops and nearly 90 000 households.
- However, generally favourable rains and relatively few outbreaks of pests and diseases, together with improved civil security situation, have resulted in an above average cereal harvest of about 859 000 tonnes, almost similar to last year's good level of production.
- Market prices for sorghum, the main cereal staple, are generally stable, with nominal prices even showing a declining trend in parts, reflecting the favourable outturn of the 2007 harvest and increased trade.
- With a 2008 projected population of 10.22 million, including returnees, an overall deficit of about 93 000 tonnes is estimated until next harvest towards the end of the year. This excludes an estimated 159 000 tonnes of cereals produced in the mechanised sector, but which are destined for Northern Sudan.
- Satisfactory livestock and pasture conditions, with favourable terms of trade for pastoralists, have prevailed over most of Southern Sudan.
- Despite the good harvest, civil insecurity, population displacement, poor infrastructure and weak marketing system continue to place physical and financial constraints on access to food and make large numbers of vulnerable people dependent on food assistance. As a result, some trade takes place from surplus to adjacent deficit areas, but the lack of established trading networks and the sheer lack of physical infrastructure prevent large-scale transfers to cover the estimated cereal deficit.
- The recently concluded Annual Needs and Livelihoods Assessment (ANLA) estimated that about 1.2 million vulnerable people will face food insecurity during 2008 and will require approximately 76 000 tonnes in food assistance. In addition, about 372 000 returnees are expected in Southern Sudan in 2008, and will require about 26 200 tonnes for resettlement and reintegration.

1. OVERVIEW

An FAO/WFP CFSAM worked in Southern Sudan from 21 October to 7 November 2007 to estimate cereal production and the food supply situation. Information was obtained from secondary sources, rapid case studies and key informant interviews. In addition, low flying at 300m above ground level, between Mission visiting points for 80 percent of journeys made over Southern Sudan, enabled comprehensive aerial observations by the Mission teams noting the farm, field, crop condition for the duration of the flights.

Ground verification of aerial observations was conducted by collecting area and yield data from the Mission's own crop cuts and field inspections cross-checked against information obtained directly from State Ministries and from the county Ministry of Agriculture (Ministry of Rural Development) staff, farmers, traders, herders, staff of NGOs and international agencies.

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.

The following locations were visited: Northern Bahr el Ghazal- Aweil, Alek, Muatang, and Ariek Weik; Western Bahr el Ghazal- Raja, Wau, Kor Malang, and Akoi; Unity - Bentiu and Rubkona; Central Equatoria - Yei, Terekeka, Juba, Kapuri, and Gudele; East Equatoria - Ikotos, Kapoeta and Torit; Upper Nile - Malakal, Mohamed el Jack, Obels 2 and 3, Dulip Hill, Nasir and Pagak; Jonglei - Akobo and Bor; Warrap - Tonj and Gogrial; Lakes - Rumbek and Cuibet; Western Equatoria - Yambio and Tambura.

The Mission team of 16 persons included representatives from the Government of Southern Sudan (GOSS) Ministry of Agriculture and Forestry and Southern Sudan Relief and Rehabilitation Commission (SSRRC), USAID-FEWS, WFP and FAO. Location specific information was provided by the NGOs Action Contre la Faim (ACF), German Agro Action, Oxfam-UK, Red Crescent, NHDF, NCDA, NPA, LWF, SudanAid, Swedish Free Mission, Women's Self Help, Catholic Relief Services (CRS), Tearfund, and VSF-Belgium.

The Mission Team was supported by information from the FAO Emergency Unit in Juba, Food Security Information for Action (SIFSIA), Juba and Khartoum and the WFP Vulnerability Analysis and Mapping (VAM) Unit. Recent UN OCHA releases were collected relating to population and flood damage, UN RRR data were obtained regarding returnees and ECHO provided the Mission with Humanitarian Aid Commission (HAC)'s

Flood Watch reports. A macro-economic digest of the public sector was provided by the World Bank, Juba office.

In accordance with the approach adopted in previous years, the Mission has estimated cereal production (CP) in each county derived from the model:

CP= number of households farming x cereal area per farming household x yield per unit area

The number of households farming is calculated using the latest estimated settled population divided by the 6 (UN adopted average household size) adjusted, this year, for flood losses. Cereal area is obtained from historical data, fine-tuned annually according to Mission observations; and yields per unit area are determined using previous CFSAM figures adjusted for this year's conditions determined by the Mission. 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 2008. 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 next year, which may not be the case.

The positive effects of timely rains with few significant breaks augmented production in all areas unaffected by floods (90 percent of farming households) with increased estimates of areas cultivated and enhanced yields. Farmed area is also expected to have increased due to the presence of 130 000 *organised/assisted* returnees (22 000 households) of which are thought to have arrived before 2007 and will have farmed this year¹.

However, these effects must be offset, at national, state and county levels against losses of crops on flooded and waterlogged fields. An estimated 7 955 km² of floodwater, mapped between May and August, 2007² in the *three* most affected states connects to a possible loss of crops for 20 000 households³. Mission disaggregated data collected from the *six* affected states⁴ recognised by GOSS and including floods and water-logging occurring after August, suggests some 56 000 ha of crops of some 89 000 households have been affected. Further, this year's Mission revised the population data upon which area estimates are based, realigning the CFSAM 2006, mid-2007 prediction with UN OCHA's latest population map thereby slightly reducing the estimated population for settled rural communities with a concomitant effect on area farmed.

The net result suggests that the area harvested in 2007 is similar to the CFSAM estimates in 2005 at 849 000 ha producing 859 000 tonnes at an average yield of 1.01 tonnes per ha. It should be noted that these production orientated figures do not include any activities of the estimated 1 100 000 *spontaneous* returnees (IDP and refugees), whose whereabouts are uncertain.⁵ Such returnees are most unlikely to be able to farm in their initial year for plots need clearing and the land cultivating by hand, which takes a lot of time and/or money to employ or attract labour groups under the *nafeer* system. 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 only on-farm stocks, noted by the Mission, are those held by farmers in Western Equatoria. These may be as high as 2 tonnes of grains per homestead given the good season last year. As these stocks are carried over from year to year, they are not included in the calculation of any surplus/deficit. They comprise a mixture of cereals, oilseeds and pulses being mostly maize, upland rice, finger millet, sorghum, beans and groundnuts, the markets for which are limited and storage losses are high. This wide variety of grains is, therefore, used in the home and explains the high per capita-per annum consumption figure used in the balance for an area where the preferred staple is cassava.

Previous NGO attempts to promote the increased production of maize and sorghum for sale in Western Equatoria foundered when purchase of the increased quantities did not occur (2000). However, the area is famous for its farmers and the local capacity to produce all year round. New local purchase initiatives are

¹ UNMIS Returnees, Reintegration and Rehabilitation, August 2007.

² UN OCHA Flood Analysis, May and July 2007.

³ UN Humanitarian Aid Appeal, September 2007

⁴ UNHA assessments are on Upper Nile, Unity and Jonglei; other states affected are North Bahr el Ghazal, Lakes and Warrap.

⁵ UNMIS Returnees, Reintegration and Rehabilitation, Summary Table, August 2007.

highly desirable to promote development, but, because of the small size of farms and the recent history of broken promises, the initiatives will need to be connected to farmers associations (extant in Yambio, Tambura and Maridi) and long-term (five year) binding contracts. *Ad hoc* marketing expeditions are unlikely to find the surplus stored at farm level without the fore-mentioned type of negotiations.

The harvest estimate noted in Table 6 connects to a cereal surplus of 3 200 tonnes for a settled population in the urban and rural areas projected to mid-2008 to 8.99 million people. When 1.23 million spontaneous and *organised* returnees are included in consuming group, the demand, anticipating an average use of 85kg/head/annum, creates a deficit of 93 200 tonnes. Cereal production from the mechanized sector is noted to be higher than last year's estimate at 159 000 tonnes, due to an increase in small-scale mechanised units in Renk (undemarcated farmers), and, on a much smaller scale the production from some 3 000 ha in Bentiu and 2 000 ha in Malakal. So far, pest threats have either been minimal or dealt with by the Renk-based Ministry plant protection unit. However, migratory *Quelea quelea* birds will remain a threat to the later sown crops until they are harvested in January.

Based on the Annual Needs and Livelihoods Assessment (ANLA) estimates, about 1.2 million vulnerable people and an estimated 372 000 expected returnees will require a total of about 102 000 tonnes (76 000 tonnes and 26 200 tonnes respectively) in food assistance.

2. BACKGROUND TO SOUTHERN SUDAN

2.1 General

Southern Sudan, is an area of 640 000 km² with a Mission estimated settled population of 8.99 million based on UN OCHA's 2007 rural population⁶ and an urban population estimate based on previous CFSAM estimates of garrison towns.⁷

The signing of a Peace Agreement in 2005, which ensures 6 years of peace before a plebiscite in 2011 that will determine the future of the region, either as an autonomous part of Sudan or as an independent sovereign state, has created the conditions for the return, since 2005, of an estimated 1.23 million people (UN RRR, Juba, (August 2007)) boosting population estimates to over 10 million.

During this transition phase, the autonomy of the South has been agreed and the necessary institutions to cater for "one country, two systems" are functioning. As part of this process the Government of Southern Sudan (GOSS) has established *inter alia* four Federal Ministries directly concerned with natural resources being, the Ministry of Agriculture and Forestry, the Ministry of Animal Resources and Fisheries, the Ministry of Water Resources and Irrigation and the Ministry of Environment and Wildlife Conservation. These four Ministries connect to ten State Ministries changing from the former State Ministries of Agriculture administered from Khartoum to Ministries of Rural Development and Natural Resources administered from Juba.

The GOSS 2007 budget was approved in January at US\$1.622 billion and is similar to the actual expenditure of US\$1.538 billion in 2006 summarised below in Table 1⁸

⁶ The original figures were derived from Starbase data.

⁷ All agencies, including SSCSE, are concentrating on planning the implementation of the 2008 census in February. No estimates have been made for 2008. This Mission cleaned last year's data removing anomalies so that there were a closer fit with OCHA 2007 released estimates, resulting in a 1 percent lower population figure than the mid-2007 figures used in CFSAM 2006.

⁸ Mission summary, World Bank, Juba data.

Table 1: Southern Sudan - Summary Budget 2006 by Sector

	Budget (\$m)	%	Actual (\$m)	%	Execution Rate (%)
Accountability	14	1.0	285	18.5	2 036
<i>Finance and Economic Planning</i>	(5)	(0.4)	(278)	(18.1)	(5 560)
Economic Functions	18	1.3	21	1.4	117
Education	137	9.9	104	6.8	76
Health	109	7.9	63	4.1	58
Infrastructure	279	20.3	166	10.8	60
Natural Resources & Rural Dev.	59	4.3	55	3.6	93
Public Administration	26	1.9	85	5.5	327
Rule of Law	74	5.4	162	10.5	219
Security	533	38.7	555	36.1	104
<i>Of which SPLA</i>	(526)	(38.2)	(552)	(35.9)	(105)
Social & Humanitarian Affairs	13	0.9	39	2.5	300
Transfers	115	8.4	3	0.2	3
Reserves					
Total	1 377		1 538		112

Source: World Bank, Juba 2007

Regarding budget distribution, the percentage received for agriculture *per se* (component of Natural Resources and Rural Development) is small compared to other sectors and is directed to the establishment of the senior cadre. However, staffing is still weak with paid appointments only at federal and state levels resulting in Ministers, Directors-Generals and Directors with no staff to direct and no general operational funds.

Sectoral operational activities are presently limited to UN agency and NGO rehabilitation programmes linked to humanitarian aid programmes previously organised through Khartoum and from Lokichokio, (Kenya). These are now organised from Juba providing a much greater coherence connecting to support for returning refugees, IDPs and marginalized communities with food aid and providing support to health, education, agriculture and civil development programmes for the settled and returning families throughout the South.

Table 2: Southern Sudan - Total Donor Contributions 2007 to 2010 by Sector

	2007		2008		2009		2010	
	(\$m)	%	(\$m)	%	(\$m)	%	(\$m)	%
Accountability	18.023	13.1	7.493	1.8	4.780	2.6	0.150	0.1
Economic Functions	N.A.		3.690	0.9	4.390	2.4	4.680	3.1
Education	N.A.		63.981	15.6	32.601	17.7	20.042	13.4
Health	17.849	13.0	97.786	23.8	106.227	57.7	122.136	81.4
Infrastructure	42.126	30.6	132.505	32.2	0.500	0.3	N.A.	
Natural Resources & Rural Dev.	32.912	23.9	27.277	6.6	9.449	5.1	0.113	0.1
Public Administration	18.350	13.3	16.060	3.9	15.680	8.5	N.A.	
Rule of Law	N.A.		14.627	3.6	4.440	2.4	2.940	2.0
Security	2.317	1.7	21.816	5.3	N.A.		N.A.	
Social & Humanitarian Affairs	5.883	4.3	25.883	6.3	5.883	3.2	N.A.	
Total	137.460		411.118		183.950		150.061	

Source: World Bank, Juba, 2007.

Funds for the extant development programmes are, in the main, from a Multi Donor Trust Fund (MDTF) and are summarised in Table 3, which, as part of the total donations summarised in Table 2, make up approximately 10 percent of the total budget for 2007. Unfortunately, the contributions of the MDTF for 2007 are not complete; however, it appears that within these funds natural resources and rural development feature prominently in 2007 but decline rapidly thereafter.

Table 3: Southern Sudan – Multi-Donor Trust Fund (MDTF) Contributions 2007 to 2010 by Sector

	2007		2008		2009		2010	
	(\$m)	%	(\$m)	%	(\$m)	%	(\$m)	%
Accountability	11.600	17.8	2.500	1.7	1.130	1.0	N.A.	
Economic Functions	N.A.		3.390	2.3	3.390	3.1	3.080	3.3
	N.A.		0.300	0.2	1.000	0.9	1.600	1.7
Education	N.A.		17.800	11.9	25.500	23.6	N.A.	
	N.A.		3.000	2.0	N.A.		N.A.	
Health	N.A.		60.000	40.1	75.000	69.4	90.000	95.1
Infrastructure	42.126	64.7	50.000	33.4	N.A.		N.A.	
Natural Resources & Rural Dev.	8.950	13.8	8.950	6.0	N.A.		N.A.	
Public Administration	2.400	3.7	3.800	2.5	2.000	1.9	N.A.	
Rule of Law	N.A.		N.A.		N.A.		N.A.	
Security	N.A.		N.A.		N.A.		N.A.	
Social & Humanitarian Affairs	N.A.		N.A.		N.A.		N.A.	
Total	65.076		149.740		108.020		94.680	

Source: World Bank, Juba, 2007.

Underpinning the rural sector, the diverse natural resources of Southern Sudan traditionally support agro-pastoralist systems which include farming, animal production, fishing, hunting, gathering of wild fruits and honey, charcoal making and selling timber, building-poles and firewood according to location-specific agro-ecology and household demographics. In all but the South/Southwest the contribution of each activity to the household food economy varies from year to year, depending on the rainfall. As has been reported previously such complex systems have been seriously disrupted, in the past, through the major conflicts associated with the civil war, the concomitant lack of law and order and the rampages of armed forces such as the Lord Resistance Army (LRA) in the south - which has apparently subsided in recent months); and similar terrorist actions by renegade forces across the north. Notwithstanding the negotiated cessation of such hostilities and a general sense of improved security leading to increased freedom of movement and investment of time and energy in rural endeavours, insecurity still exists in the form of tribal clashes over territory, cattle raiding, farmer – pastoralist clashes, abduction of women and children and general insecurity in many areas especially in Unity, Jonglei and Warrap States. This year such clashes were reported to have been exacerbated by shifts in grazing patterns resulting from the effects of floods.

Improvements in road links through the construction of new roads and de-mining of old routes; and revitalised river links between the townships herald the re-establishment of commercial interchanges between agro-ecological zones, already allowing traders in West and East Equatoria and Lakes to move surpluses by bicycle, motor cycle and, to a lesser extent by truck from surplus producing areas to the towns where the population has the cash to access the products. Trade links are also expanding in the north, increasing the previously reported exchanges between the farming communities in Northern Bahr el Ghazal and merchants from northern Sudan. Similarly, there would appear to be steady trading between farmers in the eastern parts of Jonglei and Upper Nile States and Ethiopia. However, on a much larger scale, trade is noted to have increased dramatically between Uganda and Central Equatoria with regular daily arrivals of fleets of trucks bearing all manner of goods, commodities and foodstuffs. Regarding the latter, informal Ministry of Commerce and Trade estimates from Uganda suggest annual imports of 10 800 tonnes of maize meal, 1 800 tonnes of rice, 3 600 tonnes of roots and tubers and unspecified quantities of bananas, vegetables, fruits, eggs, frozen meats, fish and tinned items. No figures are available for estimated imports across the other borders or from north Sudan.

Exports this year, also estimated in Juba, include *gum Africa* (1 500 tonnes)⁹, sesame (3 tonnes) and honey (4 tonnes) plus unknown amounts of cassava flour and groundnuts.

With the exception of the oil-industry in Bentiu (Unity State) and the booming construction and service industries in Juba, the overall socio-economic situation in rural areas remains much as described in previous years with communities in the lowest rainfall zones, predominantly in the north of Northern Bahr el Ghazal and the south-east of East Equatoria, depending ultimately on humanitarian aid to augment the diverse but

⁹ Produced mostly in Upper Nile State and previously sold through Khartoum as *gum Arabic*.

deficient household food economies. Elsewhere, for the time being, few opportunities for income generation other than the manual exploitation of the wide range of natural resources are apparent.

2.2 Agriculture

The agro-ecology of the south provides a growing season varying from 130-150 days per 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 (Western Equatoria) to Kajo-Keji (Central Equatoria), 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 NGO-based extension agents in Lakes and Bahr el Ghazal. The Mission findings this year suggest an upsurge in interest as the newly established NGOs revert to the previous practice of giving away free ploughs. The withdrawal of this practice, as full-cost recovery approaches for implements were introduced in the mid-late 1990s, caused the interest shown at the time by farmers in these locations, to drop away dramatically leaving piles of ploughs unsold.¹⁰

Mechanized farming using tractors is restricted to small areas close to the former garrison towns. Only in the Upper Nile State districts of Renk and Wadakona and to a much more limited extent in Malakal, and this year in Bentiu, is tractor-farming conducted at a level that could be identified with the commercial farms of South Kordofan and Blue Nile States.

Regarding cereals, in all smallholder systems farmers grow a wide range of sorghum landraces with minor crops of maize, 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. Groundnuts also provide a regular staple and cash crop in the higher localities with more sandy soils. Green grams, cowpeas, beans, sesame, pumpkins and tobacco add to the biodiversity of the northern farming areas. 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 half or more of the carbohydrate nutrition requirement. 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 annual cereal use of the population ranges from 60 kg to 120 kg per caput per annum according to location. In the absence of other estimates, such estimates have again been used for determining domestic requirement for the marketing year 2008.¹¹

3. CEREAL PRODUCTION, 2007

The civil war inflicted disruption led to a complete breakdown of the official gathering of agriculture statistics in all but limited areas surrounding towns previously held by the northern administration. 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. Despite the peace and improved access to wider catchment areas, data is not being collected as facilities remain much the same as before, that is to say field staff lack even the most rudimentary means of transport, materials, equipment and training.¹²

The ability to collect data and the understanding of the usefulness of accurate data remain unchanged from previous years. These characteristics connect to shortages of staff, training, equipment and supplies at state

¹⁰ The supply of free ploughs is unsustainable. Renting the units, with hand-over is 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.

¹¹ Given some apparent changes and possibly improvements in the overall food supply demand situation, estimates of per caput cereal consumption need to be verified, preferably through a proper consumption and expenditure survey.

¹² 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.

level and the need to transform the working culture and conditions. Further, at county and field level, workers lack the skills and experience necessary for objective agricultural assessments. The NGOs present are far better equipped and prepared for systematic data gathering and analysis but staff is not trained with regard to objective assessment of production or related activities, except for the gathering of rainfall data¹³. Local crop assessment is, therefore, based on verbal exchanges between farmers and MOA/NGO staff in the towns and SSRRC/ State Ministry volunteers/NGO staff dialogues with farmers elsewhere in the countryside. The Government of Southern Sudan (GOSS) with the technical assistance of FAO through European Commission funding is implementing an institutional capacity programme, Food Security information for Action (SIFSIA), which is making headways in putting the necessary infrastructure to generate systematic and reliable food security related data.

Against this background, the Mission visited a total of twenty-four locations in the ten States encompassing the seven agro-eco systems of the south. Eighty case studies/key informant interviews were conducted as were field inspections of growing crops, crop yield estimations using the Pictorial Evaluation Tool¹⁴ (Robinson and Stirling, 2006) and crop cutting techniques; and market surveys.

Aerial observations of farms occupied, fields cropped and the type and condition of crops grown were made from aircraft flying 300m above ground level during 80 percent of the Mission's movement from location to location. This added a further dimension to the assessing process, placing case studies of single farms into the general context of the areas over flown.

The sum of all activities enabled the Mission to obtain an independent picture of agricultural production across 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 factors selected to determine:

- number of households in each county by dividing the mid-2007 population estimate (not including the 1 100 000 spontaneous returnees) by an average of 6 persons;
- percentage of households in settled population including long-term IDPs farming in 2007 as noted by and reported to the Mission;
- area cropped by cereals per household this year, including home-gardens and far-fields as noted by and reported to the Mission.

This year's base calculations are derived from population statistics by county prepared by the Mission based on;

- UN OCHA 's Population Density Map (2007) for the rural areas
- CFSAM population figures for garrison towns used in 2005.

The estimated cultivated area of the potential farms of the 130 294 *organised* returnees (22 000 households) of which 11 000 households are noted to have arrived before 2006 and have probably been farming, have been added to the calculated area. The estimated area affected by the extreme events during 2007 has been subtracted from the total.

Regarding the extreme events, an estimated 7 955 km² of flood water, mapped between May and August, 2007¹⁵ arising from both heavy rains and the rising waters of the Nile in the three most affected states translates to a loss of crops of 20 000 households¹⁶. Disaggregated county data, collected by the Mission during the field visits in late October from the six affected states¹⁷ and including floods and water-logging occurring later in the season, suggests some 56 000 ha of cereal crops of some 89 000 households have been lost. Further evidence of continued flooding is provided by the Ministry of Humanitarian Affairs (HAC-

¹³ The necessary rigour to collect rainfall data accurately is invariably absent; missing data at crucial times is a common phenomenon.

¹⁴ Robinson I. and Stirling C. (2006) PET- Southern Sudan; Pictorial Evaluation Tool for Crop Harvest Assessment in Southern Sudan. Centre for Arid Zone Studies, UK.

¹⁵ UN OCHA Flood Analysis, May and July 2007.

¹⁶ UN Humanitarian Aid Appeal, September 2007

¹⁷ UNHA assessments are Upper Nile, Unity and Jonglei; other states affected are Northern Bahr el Ghazal, Lakes and Warrap.

Flood Watch September 2007, Khartoum). HAC reports that at Malakal (Upper Nile State) in September, the Nile level was 39 cm higher than the level recorded in 1988 when the last major floods were recorded, implying that areas prone to flooding in what are well-known to be flood plains, have been more severely affected this year in terms of spread and duration of flood waters and reinforcing the probability of additional affected areas.

Table 4 displays by county the estimates for population and the derived data relating to:

- Households farming, average farm sizes, flood affected areas and area of cereals.

The estimates of percentage of households actually farming and cereal area per household are based on Mission and local estimates in the areas visited or observed by the Mission during aerial transects. 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, in northern Unity and parts of Upper Nile maize is the dominant cereal.

Given the improved conditions prior to the floods, cereal area per household is noted to be higher than last year 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 from the aerial transects to 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, working for individuals with cash to invest in agricultural expansion in areas further south in Gogrial, Tonj, Lakes and Western Equatoria where the main season rainfall is reliable and security is better than before.

Farms in parts of Torit, all of Kapoeta in East Equatoria and in Pibor and other parts of eastern Jonglei are all comprised of far-fields being large blocks of group-based, hand-cultivated sorghum set apart from the villages. Such farms were recorded as clearly productive this year during the aerial transects across the areas noted.

Consequently, the traditional sector planted cereal area estimates are again higher this year at 0.904 million ha from a slightly reduced population figure used to derive area data. However, adjusting for the reported flooded or waterlogged areas, the net harvested area is expected to be 0.849 million ha. This area figure does not take into consideration of replanting both organised and spontaneous that will occur after the floods recede. For instance FAO has programmed to support 15 000 households with seeds under the UN 2007 Flood Appeal. 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 4: Southern Sudan - Estimated settled population, farming households, cereal areas and flood-affected areas

State/County	population 2007	Households (hh) popula-tion/6	farmers %	hh farming	flooded farms	hh-flood	ha/hh	Net area harvested ha
Upper Nile								
Renk	20 615	3 436	38	1 306	0	1 306	2	2 611
Fashoda	51 605	8 601	90	7 741	1 325	6 416	0.84	5 389
Tonga	33 742	5 624	90	5 061	562	4 499	0.84	3 779
Sobat	43 518	7 253	80	5 802	725	5 077	0.63	3 199
Latjor/Nasir	419 548	69 925	80	55 940	17 940	38 000	0.63	23 940
Malakal	103 000	17 167	30	5 150	1 676	3 474	0.42	1 459
	672 028			81 000	22 228	58 772		40 377
Jonglei								
Old Fangak	188 217	31 370	90	28 233	3 005	25 228	0.63	15 893
Atar	44 813	7 469	90	6 722	3 900	2 822	0.63	1 778
Nyirrol	19 205	3 201	90	2 881	420	2 461	0.63	1 550
Ayod	191 802	31 967	90	28 770	2 333	26 437	0.63	16 655
Waat	84 503	14 084	90	12 675	1 450	11 225	0.63	7 072
Wuror	53 777	8 963	90	8 067	1 300	6 767	0.63	4 263
Diror	47 503	7 917	90	7 125	860	6 265	0.63	3 947
N.Bor	110 570	18 428	80	14 743	5 290	9 453	0.63	5 955
S.Bor	13 247	2 208	80	1 766	487	1 279	0.63	806
Bor Town	20 500	3 417	80	2 733	0	2 733	0.3	820
Pibor	163 458	27 243	50	13 622	2 364	11 258	0.63	7 092
Akobo	76 566	12 761	75	9 571	1 536	8 035	0.63	5 062
Pochalla	32 351	5 392	50	2 696	542	2 154	0.63	1 357
	1 046 512			139 604	23 487	116 117		72 250
Unity								
Ruweng	52 044	8 674	70	6 072	0	6 072	0.63	3 825
Bentiu	61 500	10 250	30	3 075	305	2 770	0.42	1 163
Rubkoana	54 673	9 112	40	3 645	0	3 645	0.42	1 531
Mayom	63 739	10 623	80	8 499	8 000	499	0.42	209
Guit	53 466	8 911	80	7 129	1 707	5 422	0.63	3 416
Koch	125 033	20 839	90	18 755	4 700	14 055	0.63	8 855
Leer	79 397	13 233	50	6 616	3 500	3 116	0.63	1 963
Panyijar/Myandit	100 807	16 801	90	15 121	1 330	13 791	0.63	8 688
	590 659			68 912	19 542	49 370		29 650
Warrap								
Twic	427 201	71 200	95	67 640	5 000	62 640	0.80	50 112
Gogrial	542 136	90 356	80	72 285	2 000	70 285	0.84	59 039
Gogrial Town	20 500	3 417	30	1 025	0	1 025	0.80	820
Tonj	769 820	128 303	95	121 888	2 000	119 888	0.84	100 706
	1 759 657			262 838	9 000	253 838		210 677
N Bel G								
Aweil W	292 464	48 744	95	46 307	4 149	42 158	0.55	23 187
Aweil N	197 361	32 894	95	31 249	1 965	29 284	0.55	16 106
Aweil E +Aw ak	411 485	68 581	95	65 152	4 690	60 462	0.55	33 254
Aweil S	232 617	38 770	80	31 016	100	30 916	0.70	21 641
Aweil Town	23 555	3 926	30	1 178	316	862	0.30	259
	1 157 482			174 902	11 220	163 682		94 447

State/County	population 2007	Households (hh) popula- tion/6	farmers %	hh farming	flooded farms	hh-flood	ha/hh	Net area harvested ha
W Bel G								
Raja	37 197	6 200	90	5 580	0	5 580	0.84	4 687
Raja Town	57 352	9 559	60	5 735	0	5 735	0.63	3 613
Wau	217 517	36 253	95	34 440	0	34 440	0.84	28 930
Wau Town	81 850	13 641	50	6 820	0	6 820	0.50	3 410
	393 916			52 575		52 575		40 640
Lakes								
Cuibet	98 707	16 451	95	15 629	0	15 629	0.80	12 503
Rumbek	372 189	62 032	80	49 625	583	49 042	1.00	49 042
Yirol	275 119	45 853	90	41 268	0	41 268	0.80	33 014
Awerial	95 497	15 916	90	14 325	487	13 838	0.70	9 686
	841 512			120 847	1 070	119 777		104 245
West Equat								
Tambura	103 446	17 241	90	15 517	0	15 517	1.10	17 069
Yambio	249 837	41 640	85	35 394	0	35 394	1.30	46 012
Ezo	91 137	15 190	85	12 911	0	12 911	1.00	12 911
Maridi	173 607	28 935	80	23 148	0	23 148	1.00	23 148
Mundri	198 673	33 112	80	26 490	0	26 490	1.00	26 490
	816 700			113 460	0	113 460		125 630
Central Equat								
Juba	68 821	11 470	80	9 176	0	9 176	0.84	7 708
Juba Town	102 400	17 067	20	3 413	0	3 413	0.63	2 150
Yei	286 169	47 695	50	23 847	0	23 847	0.84	20 032
Kajo-Keji	154 789	25 798	90	23 218	0	23 218	0.84	19 503
Magwi	124 777	20 796	90	18 717	0	18 717	0.70	13 102
Terekeka	75 557	12 593	85	10 704	0	10 704	0.70	7 493
	812 513			89 075	0	89 075		69 988
East Equat								
Torit	189 959	31 660	85	26 911	3 000	23 911	0.63	15 064
Budi	152 796	25 466	90	22 919	0	22 919	0.63	14 439
Ikotos	150 000	25 000	90	22 500	0	22 500	0.84	18 900
Kapoeta	180 000	30 000	50	15 000	0	15 000	0.84	12 600
	672 755			87 330	3 000	84 330		61 003
TOTAL	8 763 734	1 460 628		1 190 543	89 547	1 100 996		848 907

Area data for the mechanised sector, provided directly to the Mission by the State Ministries of Agriculture in Renk¹⁸, Malakal and Bentiu are indicated in Table 5. Other crops planted in Renk this year include 26 880 ha of sesame; 2 772 ha of sunflower and 1 755 ha of guar.

¹⁸ The Mission were unable to fly to Renk so neither transects nor field observations were made, however details of this year's mechanised farming were provided through a telephone interview undertaken by the Mission leader from Khartoum. Malakal and Bentiu were visited by the Mission Team.

Table 5: Southern Sudan - Mechanised Cereal Area Estimates in 2007

Location	Crop	Area (Demarcated) (ha)	Area (Undemarcated) ¹ (ha)	Total (ha)
Renk	Sorghum	91 140	131 804	222 944
	Bulrush millet	9 177	(included above)	9 177
Malakal	Sorghum	1 680	378	2 058
Bentiu	Sorghum	3 318	-	3 318
Total	Cereals	105 315	132 182	237 497

¹Also called "traditional" by MoA, Khartoum. These are mechanised 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 real traditional sector of Southern Sudan.

The Mission notes the absence of information from both Wadkona and Melut, however, even without these data area planted exceeds the harvested area reported last year reflecting good rainfall and continued funding by the Agricultural Bank in Renk.

3.2 Factors affecting yield

3.2.1 Assessment method

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

- Cereal crops harvested and consumed during the season, which complete the performance picture for 2007 and give a tenuous indication of what may be produced next year and will be available for consumption in 2008.
- Cereal crop yields from the ongoing harvests, which are assessed by the Mission.
- Production from the long-cycle sorghum landraces to be harvested in December-January, yields of which are predicted from the plant populations, maturity and overall quality of the standing crop.

The first group of cereals 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*, *Mabior* (Bahr el Ghazal), *Atari* (East Equatoria), *Ladoka* (Central Equatoria); bulrush millet in all dryer areas and a second crop of maize in Western Equatoria.

The third group includes the main local landraces of *Aiyella* (Warrap), *Kec* (Lakes), *Gude* (East Equatoria) and *Agono* (Upper Nile).

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. Such information is gained from detailed case studies with sample farmers and key informant interviews and is combined with Mission observations using PET¹⁹, weighing of crop cut samples, review of secondary data from reports from GOSS and Khartoum MoAs and NGO sources and reviewing NDVI imagery for this season compared with previous seasons and the long-term average.

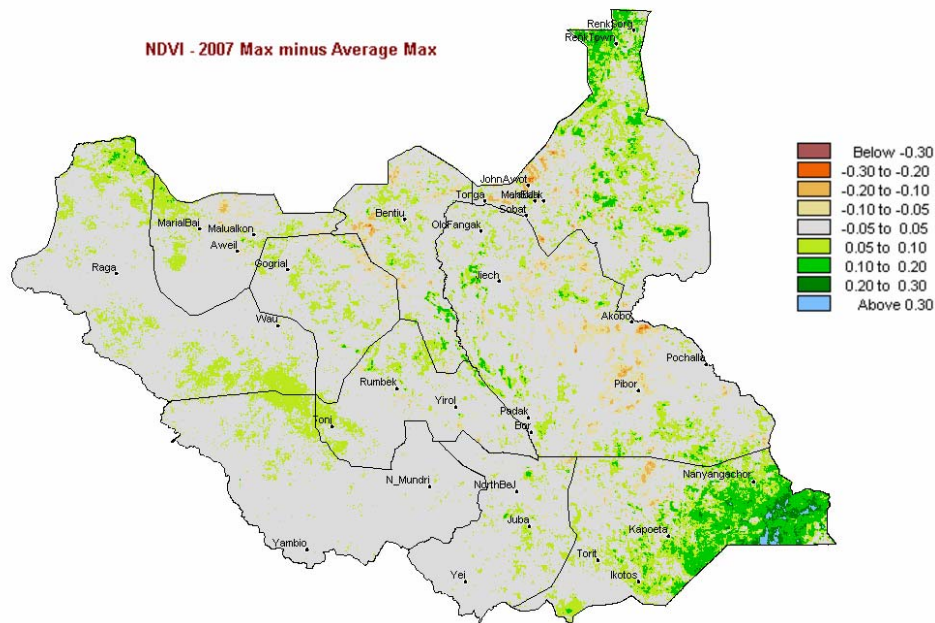
3.2.2 Rainfall

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

¹⁹ 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 are used to estimate production per plant and the fields are inspected to determine plant densities from the stubble.

mm in the Greenbelt. During 2007, remote sensed data and rain-gauge data from 40 sites were combined and analysed by the agro-meteorological section of FAO-SIFSIA to provide the first truly comprehensive picture of the rainfall pattern and quantity throughout the country. The basic pattern, discernable across the south, was far better than last year, with rains starting at the expected time and continuing, less erratically than last year, until at least September. The quantity of precipitation over the year is noted to be well above normal resulting in an average or better than average vegetation index everywhere as shown in Figure 1.

Figure 1: Southern Sudan - Seasonal NDVI: Comparison of 2007 with long-term average



However, as might be expected in a region where the dominant soils are heavy clays and huge blocks of three states are riverine swamps, heavy rains generate waterlogging and local floods which restrict access to low-lying agricultural land and cutting off pasture in localities noted as brown spots in Figure 1.

More detailed descriptions of the rainfall distribution and comparative vegetation indices in 19 locations for the 10 States are included in the graphs in Figure 2 below. These plots show the FAO-SIFSIA²⁰ analysed remote-sensed and rain-gauge data for several points in each state. The histograms provide an excellent picture of dekadal rain through the season to early October compared to the long-term average. They confirm the good rainfall this season throughout the country.

The first two graphs from Alek and Maualek depict rainfall distribution in North Bahr el Ghazal. The graphs show a timely start and a much better rain than average through most of the season except for a clear indication of a drier than normal spell in May, which lowered the vegetation index to the normal expected level for the month of June. Heavy rains in June and August contributed to the floods and waterlogging affecting 11 000 households as noted in Table 4.

Similar rainfall patterns but with higher values are apparent in the graphs for West Bahr el Ghazal (Wau and Raga) and Warrap (Gogrial and Tonj) with advantageous effects on yields but with flood related cropland losses connected to 9 000 households in Warrap.

The Lakes graphs of Rumbek and Yiro show timely starts and well-distributed rains above the monthly cereal crop requirements throughout the season, except for a short drier than usual period in May. The graphs do not show any excess rainfall on June or August although precipitation is above normal in both places to the advantage of the growing crops, pasture and browse.

²⁰ Rogerio Bonifacio, Khartoum 2007.

The plots for Western Equatoria from Yambio and Mundri, the Greenbelt, show a late start to the season followed by well-distributed rains from March to October conforming to the normal pattern but always above the long-term average.

The plots for the East Equatoria counties Torit and Kapoeta are equally as positive as the plots for Western Equatoria, with much more rain than normal falling in the usually semi-arid south-eastern corner of the country, boosting production of pasture and browse and water supplies.

Central Equatoria sample counties of Terekeka and Yei follow the same pattern as East Equatoria but at a higher level of precipitation. The plots for Jonglei, from Bor to Akobo, reflect a similar pattern of heavier than normal rainfall, well distributed throughout the season. However, given the predominance of heavy clay soils, the May-June heavy rains in the Jonglei counties are not reflected positively in the NDVI values suggesting that rains and river overflows resulted in water-logging of fields and pasture in the lower-lying areas. This is mirrored by the number of households in the State with flood-related crop losses, noted at 23 400 households, in Table 4.

Unity (Bentiu) and Upper Nile State plots for Renk and Sobat confirm that the overall pattern of heavier rainfall than last year extends across the south. However, in July the very heavy rains in Renk are noted to have been cause for concern with delays in land preparation in the mechanised sector a possible outcome, no first hand information is available.²¹ Flooded croplands in both states are noted in the data collected by the Mission to have affected nearly 42 000 households.

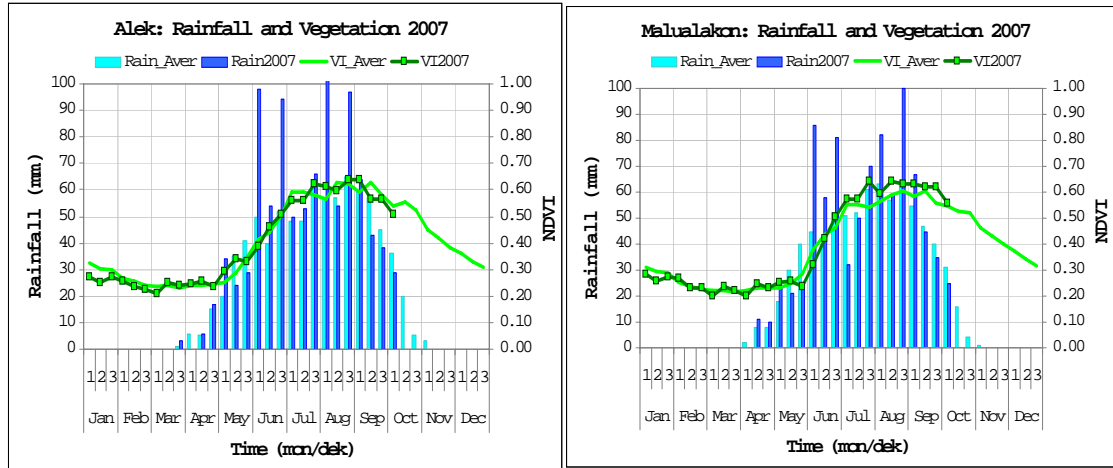
The general effects of this year's rain may be summarised as follows:

- A better than average vegetation index across the country.
- Flood related losses for some 10 percent households at the national level.
- A good performance of the early-planted, short-cycle sorghums and early-planted maize in North Bahr el Ghazal, Upper Nile, West Bahr el Ghazal, Jonglei, Unity and Lakes.
- Extended planting of middle-cycle sorghums in all areas and an improved crop performance to date over last year in all localities with a very much better than normal performance of all crops and vegetation in East Equatoria.
- Extended planting of long-cycle sorghums in all areas and an improved performance to date over last year in all localities where such crops are regularly grown.
- A late start to the season in Western Equatoria, followed by well-distributed rains to date.

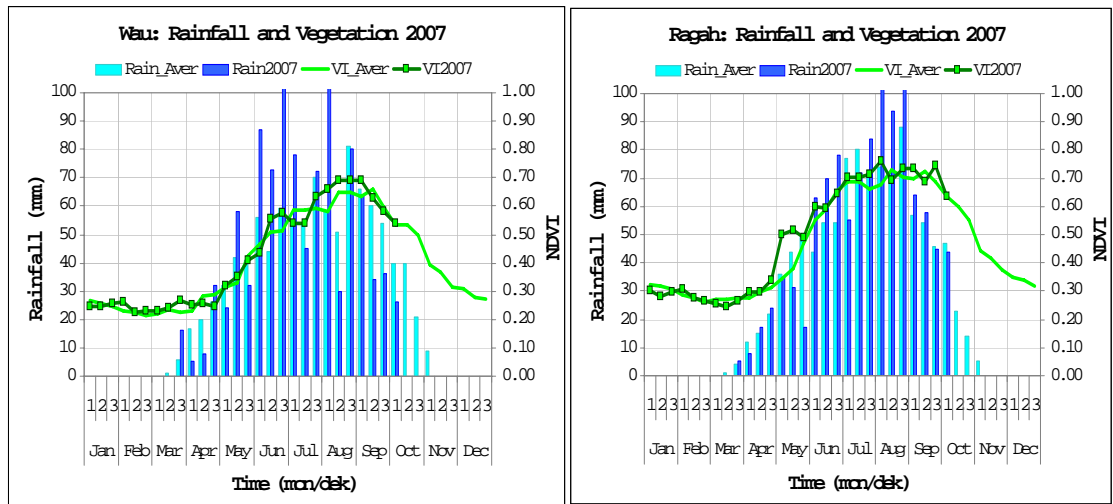
In Malakal, only three mechanised farmers could take advantage of the improved rains for financial reasons as no banks offered loans so farmers funded their own mobilisation and cultivation costs.

²¹ The Mission was unable to visit Renk as access to local airstrips was denied and Renk strip was unlandable through lack of maintenance. Road access from the north is much simpler, therefore, Renk should be included in the North Sudan assessment.

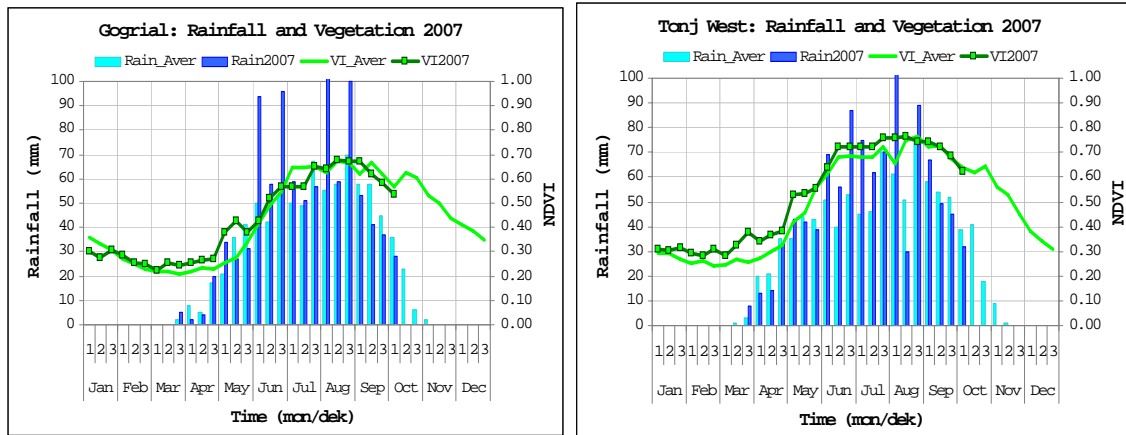
Figure 2: Southern Sudan - Rainfall distribution and vegetation indices at 19 sites
2A) North Bahr el Ghazal



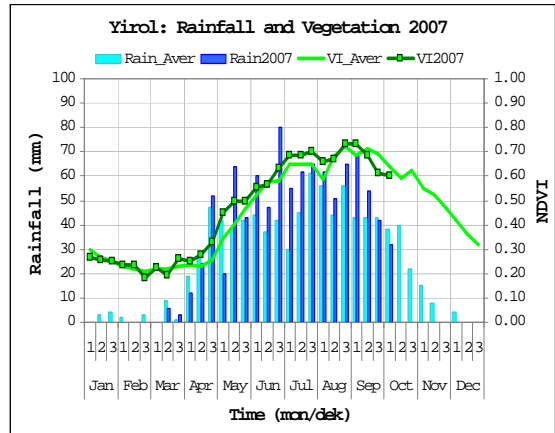
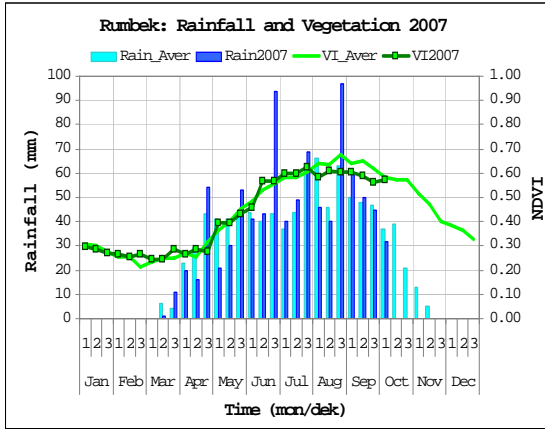
2B) West Bahr el Ghazal



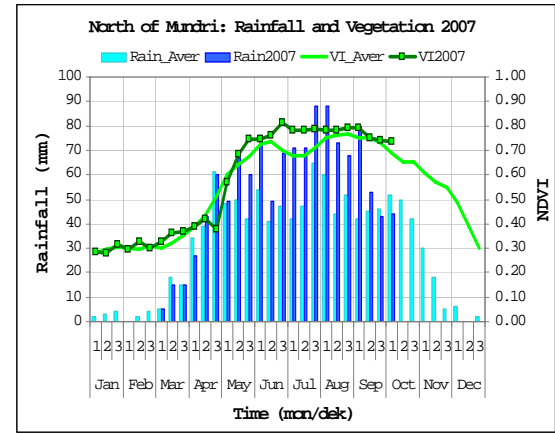
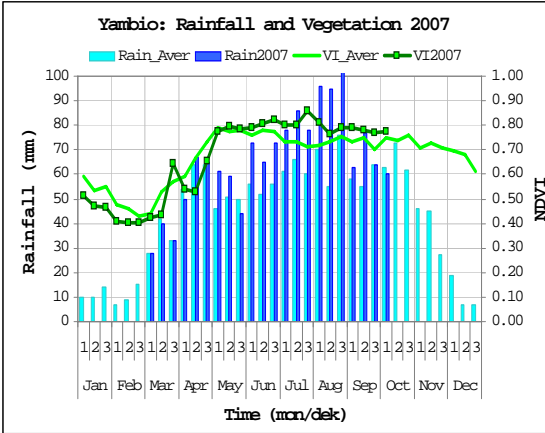
2C) Warrap



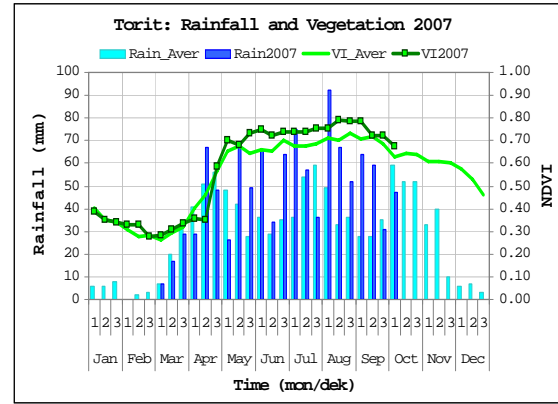
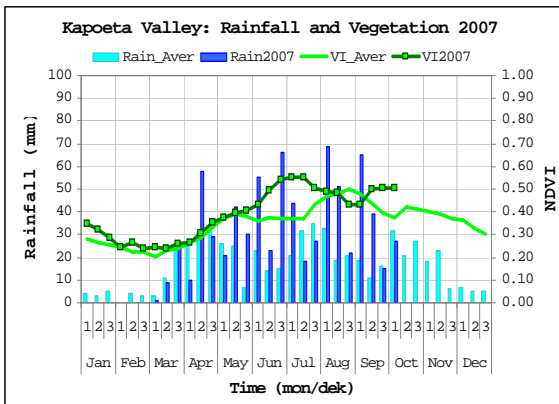
2D) Lakes



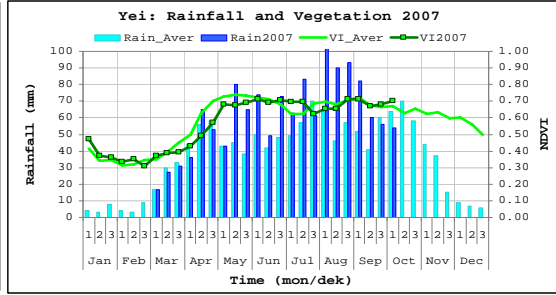
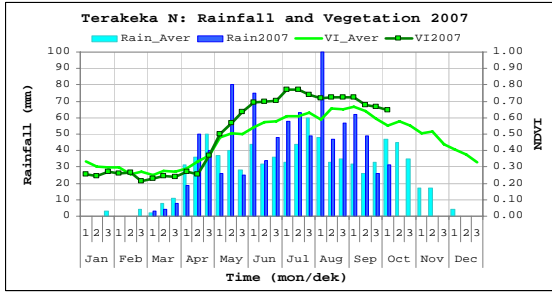
2E) West Equatoria



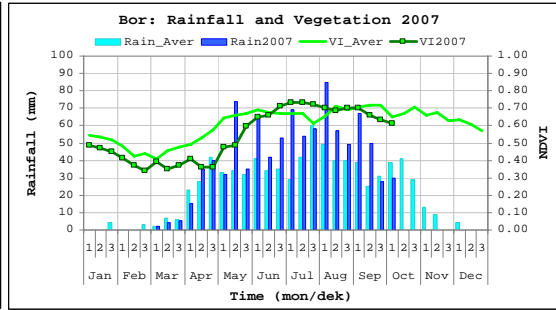
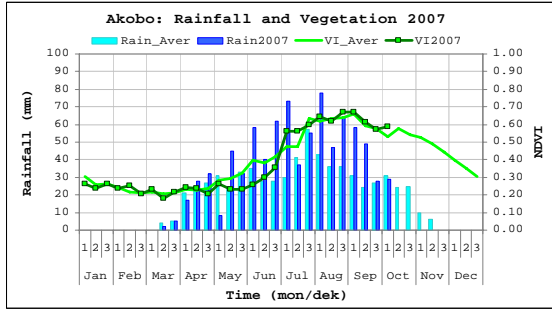
2F) East Equatoria



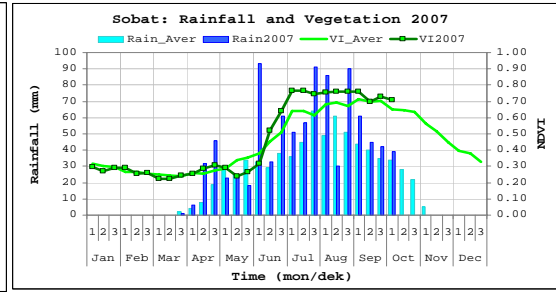
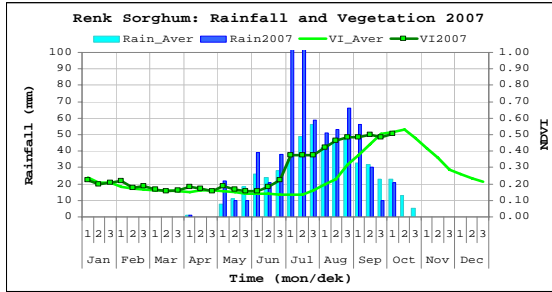
2G) Central Equatoria



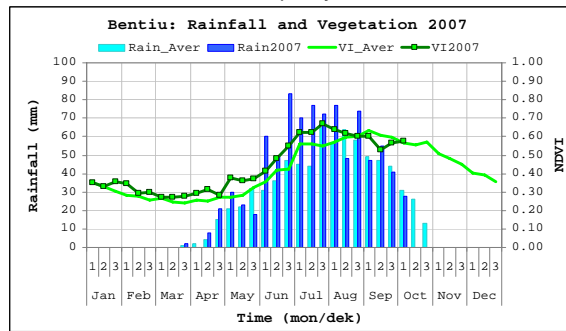
2H) Jonglei



2I) Upper Nile



2J) Unity



3.2.3 Inputs

Traditional sector

The traditional sector depends predominantly on family labour, hand power, local seeds and soil fertility sustained by a shifting cultivation that is usually determined by community decision. As such, within the context of land available and security of growing crops away from the homestead, farm sizes are connected 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* according to locality and culture. Consequently, the average cereal area ranges from <0.42 ha per household to >2.0 ha per household with this year's average farm size calculated to be 1.01 ha due to more distant-fields and increase in farming in East Equatoria due to a reduction in LRA hostilities.

Animal traction, introduced in Yei, Lakes and Bahr el Ghazal, can make a difference at household level with farm sizes more than doubling, however, manpower is required to weed and in good rainfall years this is often too expensive an input for the farmers to be able to afford, therefore, full advantage of the extended area is not always enjoyed. This effect, coupled with a reported lack of spares such as landslides, bolts, chains, shears and wheels, and the full cost- recovery approach adopted by the NGOs requiring either cash payment or hefty deposits and complete reimbursement in the first year, reduced the uptake of animal drawn plough technology after an encouraging start in the mid-1990s which had resulted in the distribution of some 5 000 ploughs. Two years ago, FAO supported training programmes had ceased in the sample sites visited and ploughs remained unsold and undistributed at NGO depots. However, in the past 2 years, new initiatives to maintain the impetus of uptake of the technology have started. In Ikotos (CRS), Yiol (BYDA) and Alek (Farm Africa) small-scale programmes are evident but these initiatives are based on the free distribution of ploughs that has already proved to be unsustainable²².

Closer to the towns tractors are the preferred option for agricultural expansion. This year, few significant tractor operations were noted by Mission, Teams reported 8 tractors working in Central Equatoria (2 Juba with a further 6 in other counties); and none in use in Wau or Raja, which is surprising as tractors were used for IDPs and civil servants under the previous administrations. However, tractors were noted in use by local government and by private individuals in Bentiu (3 300 ha) and Malakal (2 000 ha) respectively.

No use of fertilizers, pesticides or herbicides is noted and farmyard manure is restricted to farms in North Bahr el Ghazal, where the Mission observed in previous years 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. There is no reason to suppose that such practices have ceased, but they were not noted by the teams this year.

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 this year is no exception. After experience gained under Operation Lifeline Sudan (OLS), most NGOs agencies 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. This year, FAO purchased, imported and distributed, through NGOs, 1 800 tonnes of assorted sorghum, maize, groundnuts, and sesame seeds from Uganda. The seeds arrived in time for June/July planting in most areas, however, Mission interviews suggest that imported seeds of sorghum are not the preferred varieties and are rarely used but are regularly eaten (after washing off chemicals). Imported groundnuts have also had a rather chequered reception and may suffer the same fate. Further in the main distribution zones of Northern Bahr el Ghazal and Upper Nile, maize is planted in April or May well ahead of the seed distribution in 2007. Previous CFSAM reports since 1998, have pointed out:

- The non-appearance of crops of imported sorghum on peasant farms and
- The expressed preference of farmers for their complicated array of local landraces (see Annex 1).

More learned papers, including a series of publications from the Overseas Development Institute (ODI, 1996 onwards) have identified much more useful alternative strategies for seed support. There appears to have

²² The Mission contends that a better approach would be to lease the ploughs to farmers. Ploughs would be collected after each season, repairing the units and re-leasing them the following season. When the farmers have paid for the units in rent, the units are handed over in good condition, having, hopefully proved their worth and instilled the concept of care. In the green belt, where trypanosomiasis is found precluding the use of oxen, this lease-sell practice should be extended to the 2-wheeled walking tractor and implements.

been a lapse in the GOSS/FAO institutional memory in this regard, perhaps associated to the restructuring and re-staffing/ re-focusing of programme units, which should be corrected for the benefit of future programmes if sustainable progress in seed development is the goal. The Mission suggests that administrative ease of purchase should not be the criteria for seed support. If quick, large-scale seed support is needed, providing the returnees with food grains (e.g. *feterita/agono* sorghum) from the north (Renk) to barter, locally, for seed stock would probably be a far better option.

Due to the timely start to the rains there was no widespread replanting noted this year in either the mechanised or traditional sectors. However, floods offer the opportunity for recession planting in the silt for a wide variety of crops and this is anticipated this year but is not quantifiable. FAO have embarked on a programme to supply seeds to 15 000 households for flood recession planting. Choice of local landraces may be crucial with regard to the success of this programme.

Regarding other inputs, there is an increasing demand for the hand tools generally used throughout the south and although the locally fashioned *maloda* and imported *jembe* (African hoe) are to be found for sale through the regular markets, numbers are not high.

The large-scale movement of returnees/IDPs back to farming creates a demand for tools that the local markets cannot accommodate. It is also difficult to conceive of local market forces being enough to encourage large-scale trading from neighbouring countries given the probable impecunious circumstances of returnees, therefore, the 480 000 tools supplied through the FAO programme this year has been a timely intervention.

3.2.4 Pest and diseases

In neither the traditional nor the mechanised sectors were migratory pests noted or reported to have been a problem so far this year. Common non-migratory pests noted include: local birds, rodents, millipedes, foxes, monkeys, grasshoppers, termites, stem-borer and dura-bugs (Malakal). No plant protection activities other than bird scaring and guarding against raiding monkeys, pigs and hippos were noted. 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 given the recent events in West Africa. More immediately, long-cycle sorghum crops, from Malakal to Ragah are still vulnerable to the *Quelea quelea* migrations. As there still is no apparent possibility of aerial or ground spraying of nesting sites in the eastern areas of Upper Nile State border, the risk, so clearly demonstrated in Malakal a few years ago, still pertains.

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 this year 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 last year and comprising rosette virus and leaf spot of groundnuts, mosaic virus of cassava and sorghum smut. Further, this year the Mission team noted a worrying spread of fungal diseases in the bulrush millet crops in Lorime, Ikotos which warrants investigation and action.

Yield estimates have been adjusted this year to take into consideration Mission PET and crop cutting samples and the NDVI returns for the whole season compared with last year and the long-term average provided by SIFSIA. They have been juxtaposed with the estimated areas to be harvested in Table 6 below to provide an estimate of production.

The population data are also the basis of the mid-marketing year 2008²³ population estimates for the cereal needs from which surpluses and deficits are derived.

²³ Growth rate 2.6 percent = 8.99 million to which 1.130 million returned persons should be added making the total estimated population 10.12 million.

3.3. Agricultural Production in 2007

3.3.1 Cereal Production

A. Traditional Sector

Cereal production estimates from the traditional sector this year are shown in Table 6 by county. Gross cereal production is expected to be 859 000 tonnes from 849 000 ha similar to last year's estimates but from a reduced area due to the flooding. The average yield estimate of traditional cereal production this year, at 1.01 tonnes per hectare is higher than any estimate in recent years but masks a range from 0.75 t/ha in Northern Bahr el Ghazal to 1.5 t/ha in Yambio. It should be noted the Mission spot check sample crop cuts and PET observations return much higher figures, up to 3 tonnes per 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.

Gross cereal production translates to a net production available for consumption of 773 000 tonnes when storage losses and seed use, estimated at 10 percent, are subtracted.

Table 6: Southern Sudan – Traditional Sector Estimated Area, Yield, Gross and Net Production, Consumption and Balance

State/County	Area-harvested (ha)	Yield (t/ha)	2007 cereal production (tonnes)	2007 net cereals (tonnes)	population mid-2008	consumption (t/year) ²⁴	surplus (+)/deficit (-) (tonnes)
Upper Nile							
Renk	2 611	1.1	2 872	2 585	21 151	1 269	1 316
Fashoda	5 389	1.1	5 928	5 335	52 947	3 177	2 158
Tonga	3 779	0.9	3 401	3 061	34 619	2 077	984
Sobat	3 199	0.9	2 879	2 591	44 649	2 679	-88
Latjor/Nasir	23 940	0.8	19 152	17 237	430 456	25 827	-8 590
Malakal	1 459	0.8	1 167	1 051	105 678	12 681	-11 630
	40 377		35 399	31 860	689 500	47 710	-15 850
Jonglei							
Old Fangak	15 893	0.8	12 715	11 443	193 111	11 587	-144
Atar	1 778	0.8	1 422	1 280	45 978	2 759	-1 479
Nyirrol	1 550	0.9	1 395	1 256	19 704	1 182	74
Ayod	16 655	0.9	14 990	13 491	196 789	11 807	1 684
Waat	7 072	0.9	6 365	5 728	86 700	5 202	526
Wuror	4 263	0.8	3 410	3 069	55 175	3 311	-242
Diror	3 947	0.8	3 158	2 842	48 738	2 924	-82
N.Bor	5 955	0.8	4 764	4 288	113 445	6 807	-2 519
S.Bor	806	0.8	645	580	13 591	815	-235
Bor Town	820	0.8	656	590	21 033	1 262	-672
Pibor	7 092	0.8	5 674	5 106	167 708	15 094	-9 988
Akobo	5 062	0.9	4 556	4 100	78 557	7 070	-2 970
Pochalla	1 357	0.9	1 221	1 099	33 192	2 987	-1 888
	72 250		60 971	54 872	1 073 721	72 807	-17 935
Unity							
Ruweng	3 825	0.7	2 869	2 582	53 397	3 204	-622
Bentiu	1 163	1.1	1 280	1 152	63 099	3 786	-2 634
Rubkoana	1 531	1.0	1 531	1 378	56 094	3 366	-1 988
Mayom	209	0.8	168	151	65 396	3 924	-3 773
Guit	3 416	0.8	2 733	2 459	54 856	3 291	-832
Koch	8 855	1.0	8 855	7 969	128 284	7 697	272
Leer	1 963	1.0	1 963	1 767	81 461	4 888	-3 121
Panyijar/Myandit	8 688	0.9	7 820	7 038	103 428	6 206	832
	29 650		27 219	24 496	606 015	36 362	-11 866
Warrap							
Twic	50 112	0.8	40 090	36 081	438 308	43 831	-7 750
Gogrial	59 039	0.9	53 135	47 822	556 232	55 623	-7 801
Gogrial Town	820	0.7	574	517	21 033	2 524	-2 007
Tonj	100 706	1.0	100 706	90 635	789 835	78 984	11 651
	210 677		194 505	175 055	1 805 408	180 962	-5 907
N Bel G							
Aweil W	23 187	0.7	16 231	14 608	300 068	24 005	-9 397
Aweil N	16 106	0.8	12 885	11 596	202 492	16 199	-4 603
Aweil E +Aw ak	33 254	0.7	23 278	20 950	422 184	33 775	-12 825
Aweil S	21 641	0.8	17 313	15 581	238 665	19 093	-3 512
Aweil Town	259	0.4	103	93	24 167	3 383	-3 290
	94 446		69 810	62 828	1 187 576	96 455	-33 627

²⁴ Assuming a consumption requirement of 85kg of mixed cereals per person per year

State/County	Area-harvested (ha)	Yield (t/ha)	2007 cereal production (tonnes)	2007 net cereals (tonnes)	population mid-2008	consumption (t/year) ²⁴	surplus (+)/ deficit (-) (tonnes)
W Bel G							
Raja	4 687	1.4	6 562	5 905	38 164	3 053	2 852
Raja Town	3 613	0.8	2 890	2 601	58 843	5 884	-3 283
Wau	28 930	1.3	37 609	33 848	223 172	17 854	15 994
Wau Town	3 410	0.9	3 069	2 762	83 978	8 398	-5 636
	40 640		50 130	45 116	404 157	35 189	9 927
Lakes							
Cuibet	12 503	1.2	15 003	13 503	101 273	9 115	4 388
Rumbek	49 042	1.1	53 946	48 552	381 866	38 187	10 365
Yirol	33 014	0.9	29 713	26 742	282 272	25 404	1 338
Awerial	9 686	0.9	8 718	7 846	97 980	8 818	-972
	104 245		107 380	96 643	863 391	81 524	15 119
West Equat							
Tambura	17 069	1.5	25 603	23 043	106 136	11 675	11 368
Yambio	46 012	2.0	92 023	82 821	256 333	28 197	54 624
Ezo	12 911	1.3	16 784	15 106	93 507	10 286	4 820
Maridi	23 148	1.1	25 462	22 916	178 121	19 593	3 323
Mundri	26 490	1.1	29 139	26 225	203 838	22 422	3 803
	125 630		189 011	170 111	837 935	92 173	77 938
Central Equat							
Juba	7 708	1.0	7 708	6 937	70 610	5 649	1 288
Juba Town	2 150	0.8	1 720	1 548	105 062	11 557	-10 009
Yei	20 032	1.1	22 035	19 832	293 609	20 553	-721
Kajo-Keji	19 503	1.1	21 454	19 308	158 814	11 117	8 191
Magwi	13 102	0.9	11 791	10 612	128 021	8 961	1 651
Terekeka	7 493	1.2	8 991	8 092	77 521	4 651	3 441
	69 988		73 699	66 329	833 637	62 488	3 841
East Equat							
Torit	15 064	1.1	16 570	14 913	194 898	17 541	-2 628
Budi	14 439	0.7	10 107	9 097	156 769	14 109	-5 012
Ikotos	18 900	0.8	15 120	13 608	153 900	13 851	-243
Kapoeta	12 600	0.7	8 820	7 938	184 680	18 468	-10 530
	61 003		50 617	45 556	690 247	63 969	-18 413
TOTAL	848 907		858 741	772 866	8 991 587	769 639	3 227
Returnees (Nat'l averaged used)	8 910	1.0	8 999	8 099	1 230 000	104 550	-96 451
GRAND TOTAL	857 817		867 740	780 966	10 221 587	874 189	-93 224

B. Mechanised sector

With a visit to Renk outside the scope of the Mission this year, details relating to crop conditions and performance are restricted to observations made in the Mohamed el Jack farms in Malakal. 4 900 feddan (2 058 ha) of mostly late-maturing *agono* sorghum and some earlier-maturing red *feterita* sorghum is expected to produce 3 sacks per feddan (0.66t/ha). If this performance is sustained until harvest in December- January and if crop conditions are similar in Renk and Bentiu resulting in all the cereal area noted being harvested, the contribution from the mechanised sector in 2007 are estimated at 159 000 tonnes. Results are, however, contingent on a migratory pest free remainder of the season.

C. Time series cereal production

Time series of estimates of cereal production over the past 5 years are provided in Tables 7 and 8. It is difficult to interpret at sub-national level as county/state combinations vary from year to year. However,

Upper Nile Region shows a big decline in area and production due to the floods. Production in all the other areas has increased because of the favourable rainfall condition particularly Equatoria.

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.

Table 7: Southern Sudan - Time Series 2003-2007 Cereal Production in Traditional Sector

Zones	2003		2004		2005		2006		2007	
	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	107	81	138	82	204	167	226	189	142	123
Upper Nile	53	42	89	48	59	48	67	61	40	35
Unity	16	12	31	22	41	35	48	39	30	27
Jonglei	38	27	18	12	104	84	111	89	72	61
B el Ghazal	402	306	451	306	432	374	438	359	450	422
North	243	185	295	195	95	56	104	72	94	70
West	46	34	37	26	41	38	45	41	41	50
Lakes	113	87	119	85	111	103	111	95	104	107
Warrap	0	0	0	0	185	177	178	151	211	195
Equatoria	246	247	218	199	233	259	242	258	257	314
Central	102	84	79	66	75	77	71	78	70	74
East	44	31	32	20	37	26	45	29	61	51
West	100	132	107	113	121	156	126	151	126	189
GRAND TOTAL	755	634	807	587	869	800	906	806	849	859

Regarding the mechanized sector, a wetter year is usually difficult to manage and this year has been very wet in Renk, however, more undemarcated farmers than have been noted before have boosted the lower than normal demarcated area, which suggests a higher overall performance than last year, when the returns from Wadkona and Melut are factored into the sum total.

Table 8: Southern Sudan - Time Series 2003-2007, Cereal Production in Mechanised Sector

Region	2003		2004		2005		2006		2007	
	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.	122	96	108	94	263	226	149	80	232	156
Renk ir...	10	18	11	22	1	1	na	na	na	na
Wadakona.	na	na	60	54	80	68	62	40	na	na
Melut r.	3	na	8	8	none	none	2	1	na	na
Malakal	3	2	4	4	2	1	0	0	2	1
Bentiu	0	0	0	0	0	0	0	0	3	2
Total	138	116	191	182	346	296	213	121	237	159

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 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.

Household 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. They are usually planted separately in the northern locations, in weed-free units of some hundreds of square metres, depending on family labour availability. With the emergence of animal traction, a few entrepreneurs are now growing groundnuts for sale or, apparently, for tribal based, traditional food security support mechanisms. Each year, the area under

groundnuts is expanding. Drying groundnuts were assessed last year in Wau and Tonj at numerous sites. Yields noted ranged from 1.0 to 2.0 tonnes per hectare of the dry unshelled crop, significantly higher than previous estimates by other assessors. This year, reports of crop losses due to water logging are noted in the effected counties but crops on higher ground with sandy soils are expected to have performed very well. In Lakes and Equatoria, groundnuts are inter-cropped with cassava, sesame and sorghum as well as grown in small independent plots, 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, 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 1.0 to 2.0 m apart, as well as being inter-cropped with sorghum and sesame at a much wider spacing. In Western Equatoria, inter-cropping of cassava is noted with a wide range of cereals, sesame, groundnuts and beans. Agricultural practices for cassava are noted to be similar in Raja, Wau and the Greenbelt. They involve a fixed planting season in May-June and harvesting the plots either at the end of the second or third year depending on the land available to the household. Where labour and land are available it may be planted at the end of the shifting rotation and left for three years, although most digging of tubers takes place after two years. After harvesting the tubers are skinned, chipped, soaked, dried and pounded to flour for use, storage and sale. Yields of 5.8 kg to 11.6 kg per plant at 2m centres were noted last year in Wau suggesting a fresh weight harvest of 15 tonnes (2 year) to 30 tonnes (3 year) per hectare. In Raja, an equivalent field sample yielded c 18 tonnes (2 year) per ha.

Such yields are likely to be achieved in all the main cassava-growing areas in 2007/08 and the area is likely to be increasing through the overall increase in security encouraging planting of far-fields and activities of NGOs promoting alternative crops (eg CRS East Equatoria). As against this, losses of fields to cattle appears to be of increasing concern and needs to be addressed in specific localities, perhaps with some directives from the centre with regard to responsibilities.

The mechanized sector incorporates large-scale sesame production in Renk. This year, the reported planted sesame area of 27 000 ha is lower than previous years. However, no further information is available as the Mission was unable to visit Renk.

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 ha²⁵ 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.

3.3.3 Livestock

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 per household. Under current methods of husbandry and terms of trade, 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 per 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 per 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.

This year, the Mission has no reason to suppose that numbers of livestock have diminished. Cattle raiding may have altered local distribution patterns in Jonglei, Upper Nile, East Equatoria and Central Equatoria but no significant migration out of the country, except for normal transhumance and movement of slaughter stock is noted.

Animal body condition is generally good this year. Regular reports from 120 veterinary centres throughout the country from February to September 2007 provided to the Mission from the Ministry of Animal

²⁵ Director – General of Forestry, Juba.

Resources, Juba show a predominance of good-very good pasture; a disease profile dominated by vaccinations for CBPP/ CCPP and treatment of livestock for internal parasites (nematodes and liver-fluke). Treatments for trypanosomiasis and black quarter also feature significantly but less lumpy skin disease is noted this year.

In a new initiative, the British NGO Farm Africa has supported the opening of small stores retailing animal drugs connected to their project in West Gogrial.

Unfortunately, no production data relating to birth patterns, birth indices, birth percentages or mortalities exist. However, except where animal movement has been restricted more than usual during the rainy season, Mission case studies suggest a better overall performance this year, 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, this lack of data may be resolved by identifying and following indicator units of cows in herds selected in each agro-ecological zone. Such herds were used by WSARP in the 1970s and may well serve a useful purpose under the current peaceful conditions to augment the present levels of understanding of animal production.

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 this year during field visits, in many cases linked to floods restricting access to the usual grazing areas.

Livestock prices are stable or rising in the rural markets throughout the south but are noted to have fallen since mid-2006 in some major towns (Figure 4, Central Equatoria) where the much-improved access to herders and livestock traders has increased the number of presentations.

3.4 Security

Cattle raiding in the major cattle rearing areas and clashes between settled farmers and pastoralists 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 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 current FAO land use tenure programme in Southern Sudan attempts 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.
 - 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

Despite the flood losses, the better performance of cereals this year is reflected in a gross cereal production estimate of 859 000 tonnes, which suggests a domestic availability of 773 000 tonnes, if an average of c.10 percent of the harvest is deducted for harvest/storage losses and seed use and if the sorghum harvests in prospect (late-maturing 2007 and early-maturing 2008) perform as expected. Food needs, juxtaposed with the production in Table 6, are estimated at over 769 600 tonnes for the projected, settled population of 8.99 million people²⁶, anticipating an average per capita consumption of mixed cereals of 85 kg per year.

The cereal per capita figure, which is applied to all persons of all ages, is based on the Mission adjusted (2003) WFP household food economy contributions of cereals, presuming 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.

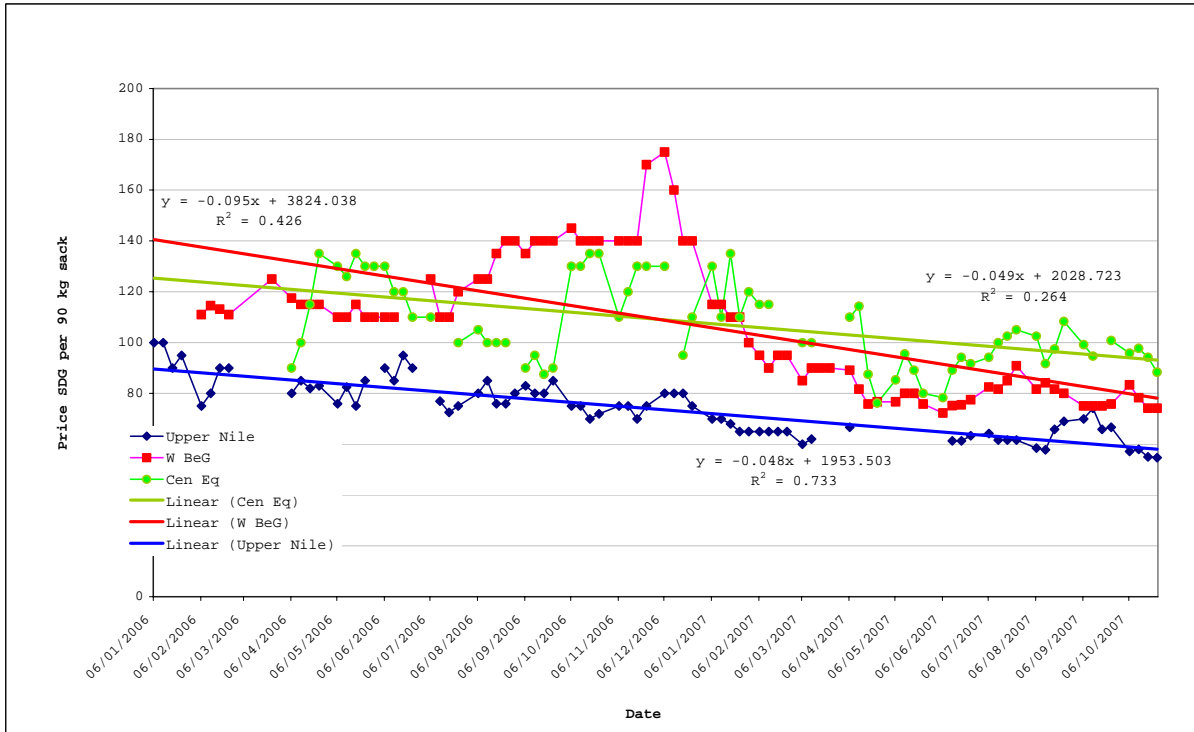
When the spontaneous and organised returnees are included there is a negative balance of 93 200 tonnes. However, if the 159 000 tonnes mechanised sector is included, Southern Sudan is in surplus by 65 800 tonnes but the concept of balance assumes that grain from areas of surplus is transferable to areas of deficit, which is not the case. Although some movement of surpluses between adjacent zones will occur through the activities of the petty traders, who move from state to state by bicycle and 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 Equatoria to Upper Nile, Unity, Jonglei or Bahr el Ghazal. Only the surpluses expected in Renk, where stocks from last year are still being held and sorghum price is 50 percent of the prices elsewhere, might be moved in the dry season to deficit areas if suitable local purchasing arrangements were made.

4.2 Cereal and livestock prices

Cereal and animal prices were collected by the Mission during visits and a comprehensive database of prices for 2006 and 2007 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 time series charts of weekly prices of all market data during 2006 and 2007 for three states West Bahr el Ghazal, Upper Nile and Central Equatoria. The resulting charts and trends are shown in Figure 3 (sorghum) and Figure 4 (goats).

²⁶ Not including the 1.23 million returnees.

Figure 3: Southern Sudan - Sorghum Prices in Three States 2006/2007



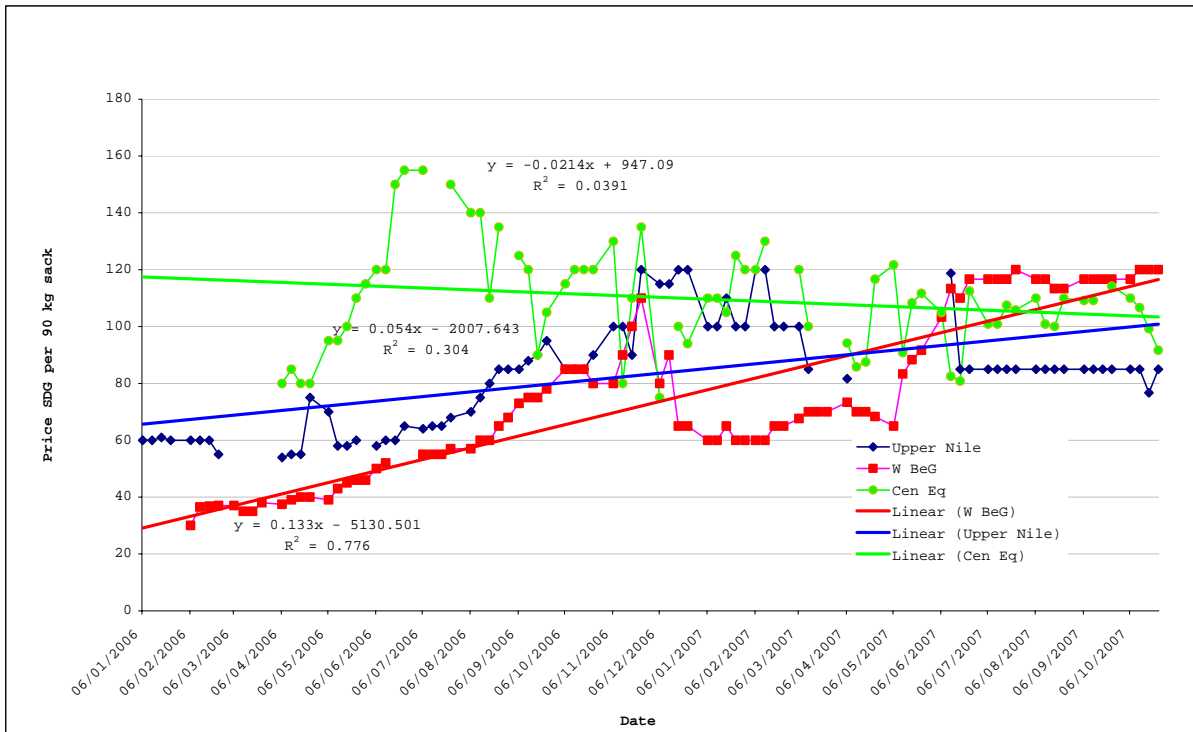
Source: WFP VAM 2007.

Except for a sudden and short-lived price increase in West Bahr el Ghazal in December 2006, sorghum price trends in each state exhibit a steady fall from January 2006 until the latest data in October 2007 dropping from 90 SDG²⁷ to 60 SDG in Upper Nile; 140 SDG to 80 SDG in West Bahr el Ghazal and from 125 SDG to 95 SDG in Juba.

Over the same period the price trend of male goats for meat has soared in West Bahr el Ghazal from 30 SDG to 120 SDG; climbed steadily in Upper Nile from 65 SDG to 100 SDG; and appears to have fallen from 118 SDG to 102 SDG in Central Equatoria due to very high prices of goats in July and August 2006 when they reached 155 SDG. Without this unprecedented or repeated price hike, the prices of goats in Central Equatoria would have remained stable throughout the 2 years.

²⁷ SDG = newly introduced Sudanese Pounds.

Figure 4: Southern Sudan - Goat Male Price in Three States 2006/2007



Source: WFP VAM 2007.

Falling sorghum prices and increasing goat prices connect generally with improved production conditions and/or food supply over the 2 years. Large sorghum surpluses in Renk may have influenced the prices in Upper Nile. Maize meal imports from Uganda into Juba, at an estimated 10 000 tonnes per annum, are very likely to have influenced cereal prices in Juba and elsewhere in Central Equatoria. Delays in the harvest reaching the market in West Bahr el Ghazal may have caused the high price of sorghum in December 2006, which fell rapidly to less than 50 percent of the highest value by October 2007.

The trends noted above have a dramatic effect on the calculated terms of trade between sorghum and goats. In West Bahr el Ghazal for instance, market prices suggest that a 90 kg sack of sorghum costing between 5-6 goats in January 2006 may now be obtained for less than one goat (October 2007). However, Mission discussions during the visits point to bartering terms of trade far more stable and in keeping with traditional mutual support systems noted, for example, in family-to-family seed exchanges. In Torit, bulls and goats have had a grain price that has remained the same for three years at 1x bull=20 tins²⁸ sorghum and 1 x goat =3 tins sorghum. A similar arrangement is noted in Akobo with a 1x goat=1x 90 kg sorghum exchange rate since 1997. If these arrangements are as common as is believed, they warrant further examination to determine their role in indigenous food security mechanisms so as to ensure that interventions do not challenge or undermine what may have evolved as a very effective safety net for pastoralists.²⁹

5. HOUSEHOLD FOOD SECURITY SITUATION

5.1 Assessment methodology

The objectives of the 2007/8 Annual Needs and Livelihood Assessment (ANLA) were to determine the relief and development needs and priorities of the vulnerable populations in Southern Sudan; identify vulnerability factors affecting food security and highlight the livelihood opportunities and constraints for post-conflict recovery and development.

²⁸ 1 tin holds 13 kg sorghum.

²⁹ *De facto* long-term contracts between partners.

Sample Design and Analysis

A sample of 1 749 households was drawn from 88 clusters (or villages) selected with probability proportion to size from six states: Jonglei, Northern El Ghazal, Unity, Upper Nile, Warrap and Western Bahr El Ghazal (Table 9). A household questionnaire was administered to each of the households and a community questionnaire was administered at the community level. Household food consumption analysis based on the Food Consumption Score (FCS) was used to estimate the percent vulnerable to food insecurity and the percent food deficit was computed based on the consumption threshold of 2 100 kilocalories per person per day for a household of six members, taking into account all the major food sources and coping mechanisms. For the other states (i.e. Lakes, Western Equatoria, Eastern Equatoria and Central Equatoria), the vulnerable population groups were estimated from the rolling assessment and other food security assessments conducted earlier in 2007.

Table 9: Southern Sudan – Number of Locations and Households surveyed by State in 2007/08 ANLA

State	Jonglei	Northern Bahr El Ghazal	Unity	Upper Nile	Warrap	Western Bahr El Ghazal	Overall
Villages/clusters	15	16	15	15	14	13	88
No. of households	293	320	297	300	279	260	1 749

5.2 Household food consumption

The food consumption analysis is based on the Food Consumption Score³⁰, which integrate the frequency of consumption and quality of food.

Food consumption analysis shows that about 18 percent of the households were in the poor food consumption group, 25 percent borderline (these two groups constitute the potentially food insecure households) and 57 percent in the good food consumption group in the six assessed states. The profile of each food consumption group (in terms of the frequency of consumption of each food) is shown in Figure 5. The poor food consumption group consumes meat, dairy and eggs about once in seven days; the borderline group consume these food items about twice per week while the good consumption food groups consume these food groups almost three times in seven days (Figure 5).

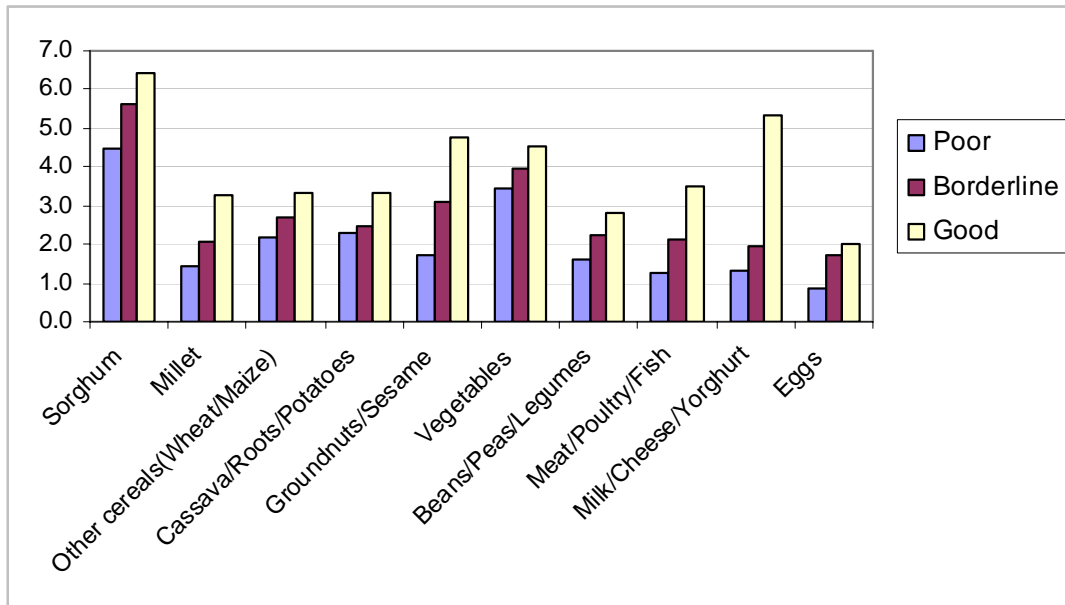
³⁰ Food Consumption score (FCS) is a measure of food security that integrates frequency of consumption and quality of food based on the seven-day dietary recall exercise and has proven to be a good proxy indicator of food access and food security. FCS is computed by multiplying the frequency of consumption of each food group with its corresponding weight and aggregating at household level as follows:

$$FCS = a_{staple}x_{staple} + a_{pulse}x_{pulse} + a_{veg}x_{veg} + a_{fruit}x_{fruit} + a_{animal}x_{animal} + a_{sugar}x_{sugar} + a_{dairy}x_{dairy} + a_{oil}x_{oil}$$

(where x_i =frequency of consumption and a_i =weight of each food group corresponding to the quality.

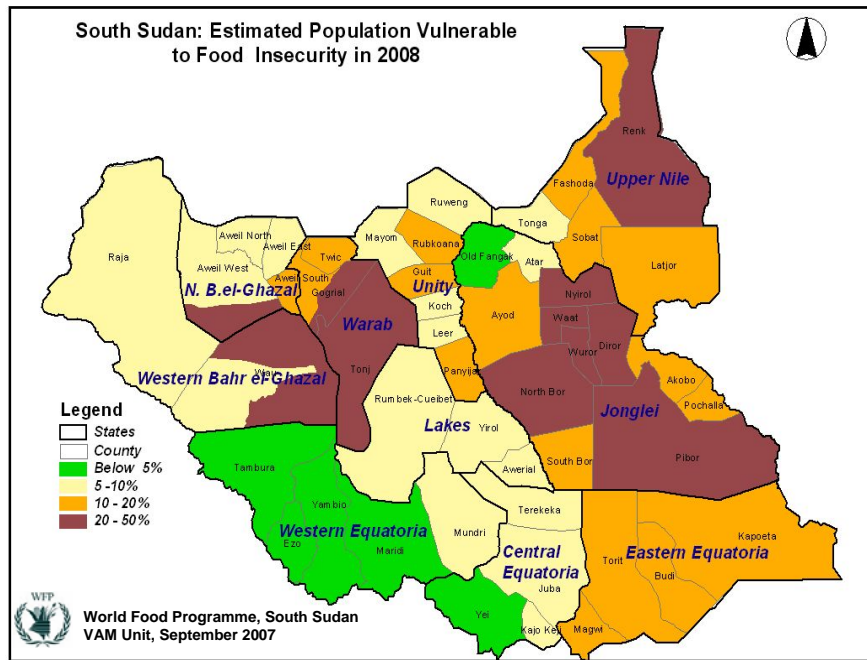
Households were classified into three food consumption groups based on the following FCS thresholds (poor—0-21; borderline—21.5-34.5 and good—> 35). Households in the poor and borderline food consumption groups, which represent households with inadequate or minimum food consumption, are used to estimate the prevalence of risk to food insecurity.

Figure 5 - Number of times food item is eaten over 7-days recall period by food consumption group



Taking into account the other states not covered by the 2007/08 ANLA, about 15 percent of the population is considered to be vulnerable to food insecurity (Figure 6).

Figure 6 - Southern Sudan - Estimated Population Vulnerable to Food Insecurity in 2008



Major parts of Upper Nile, Jonglei, Warrap and parts of Northern and Western Bahr El Ghazal have the highest proportion of population that are food insecure, followed by most of Eastern Equatoria, parts of Jonglei, Upper Nile, Unity, Warrap and Northern Bahr El Ghazal.

At least 30 percent of households assessed are applying severe coping mechanisms, which could affect households' ability to meet their future needs. Some of the coping mechanisms applied include dietary adjustments (fewer meals, reduced food intake and switch to less preferred food items) but there is increased sale of assets and dependence on fuel wood and collection of other natural products (such as

grass, building poles) for survival. Every effort should be made to ensure timely food deliveries, to the extent possible to forestall the possible use of severe coping strategies that could affect future welfare.

5.3 Vulnerability factors in 2008

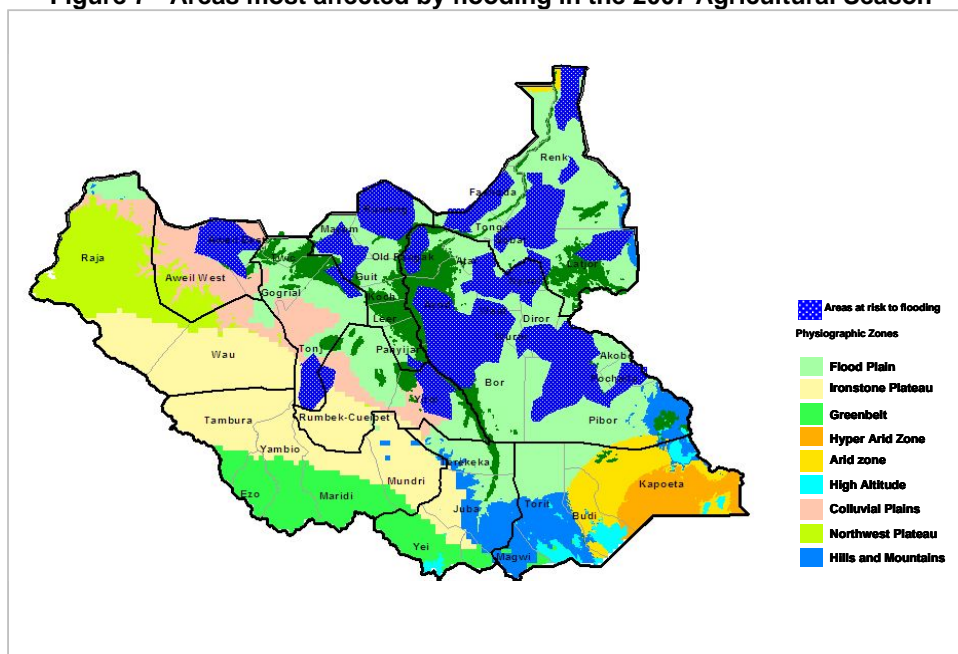
According to the assessment, there is a substantial improvement in the overall livelihoods and well-being of the population since the signing of the CPA in 2005 and this is attributed to the reduction of insecurity and displacement and the gradual improvement in the access to basic social services, increased trade and livelihood opportunities.

Market analysis show a generalized downward trend in nominal sorghum prices in the Malakal, Wau and Juba markets and this is indicative of increased trade (in terms of volume and number of traders) mainly as a result of peace and stability as well as infrastructural improvements. In addition there is evidence that Bentiu and Malakal prices have tracked the Gedaref³¹ prices, which is an indication of gradual integration of markets. However, the market monitoring from the four major markets does not provide the full picture of food access. Therefore, it is suggested that the Ministry of Agriculture expand the domain for market monitoring to allow for the detection of local-level changes in economic access.

Amidst these improvements, the effects of the longstanding war still exist. There are many areas which are yet to be covered by social services, which also lack physical infrastructure and accessibility is limited. For instance about 14 percent of the assessed locations had poor market access and net primary enrolment ratio is also very low. Structural household constraints (such as poor infrastructure, low human capital, lack of seeds and tools, low household asset endowment) still limit local agricultural production and food access from potential surplus areas despite the fact that nearly 80 percent of the households cultivated in the last agricultural season.

In 2008 four main factors are likely to predispose households to food insecurity: These are the unprecedented floods declared by the Government as a national disaster in July 2007 (Figure 7); serious localized insecurity mainly in Jonglei, localized price increases due to the introduction of the new Sudanese Pound and expected large number of returnees to the South from elsewhere in Sudan as well as from neighbouring countries. In addition to these factors there is the underlying effect of chronic poverty among some of the population groups who are unable to acquire sufficient food on their own regardless of the harvest, prices and proximity to markets. Based on these factors the average household food deficit of 34 percent is projected in 2008.

Figure 7 - Areas most affected by flooding in the 2007 Agricultural Season



³¹ Gedaref is a major market for sorghum in the surplus producing region of eastern Sudan.

5.4 Emergency food aid needs in 2008

Based on the foregoing vulnerability factors, it is estimated that about 1.2 million residents will be vulnerable to food insecurity with a corresponding total food requirement of 76 000 tonnes. Compared to 2007 this represents a 3 percent reduction in the number of beneficiaries and 5 percent increase in food assistance requirement.

Table 10: Southern Sudan - Estimated emergency food aid needs in 2008

State	ANLA Estimates for 2007		ANLA Estimates for 2008		Percent Change (2007-2008)	
	Beneficiaries	tonnes	Beneficiaries	tonnes	Beneficiaries	tonnes
Central Equatoria	41 095	2 733	32 514	1 115	-21%	-59%
Eastern Equatoria	152 651	8 180	108 947	6 442	-29%	-21%
Jonglei	195 340	10 796	271 680	14 730	39%	36%
Lakes	112 824	6 406	87 243	4 245	-23%	-34%
Northern Bahr El Ghazal	206 424	11 306	122 983	13 615	-40%	20%
Unity	79 782	4 782	73 126	4 948	-8%	3%
Upper Nile	109 565	6 279	109 432	11 221	-0.1%	79%
Western Bahr El Ghazal	89 276	5 162	109 775	5 339	23%	3%
Western Equatoria	64 718	4 002	20 630	1 017	-68%	-75%
Warrap	227 124	12 543	304 237	13 338	34%	6%
Grand Total	1 278 799	72 190	1 240 567	76 008	-3%	5%

Major increase in food aid needs occurred in Jonglei, because of the combined effect of flood and insecurity; in Northern Bahr El Ghazal due to a large number of returnees and flooding and in Upper Nile due to the impact of flooding. Food aid requirements are less in Western and Central Equatoria, Lakes and Eastern Equatoria where agricultural production has improved and the overall food security is stable.

In addition it is projected that about 372 000 returnees will return to Southern Sudan in 2008 and they will require food assistance during the transit and re-integration period amounting to 26 200 tonnes (Table 11).

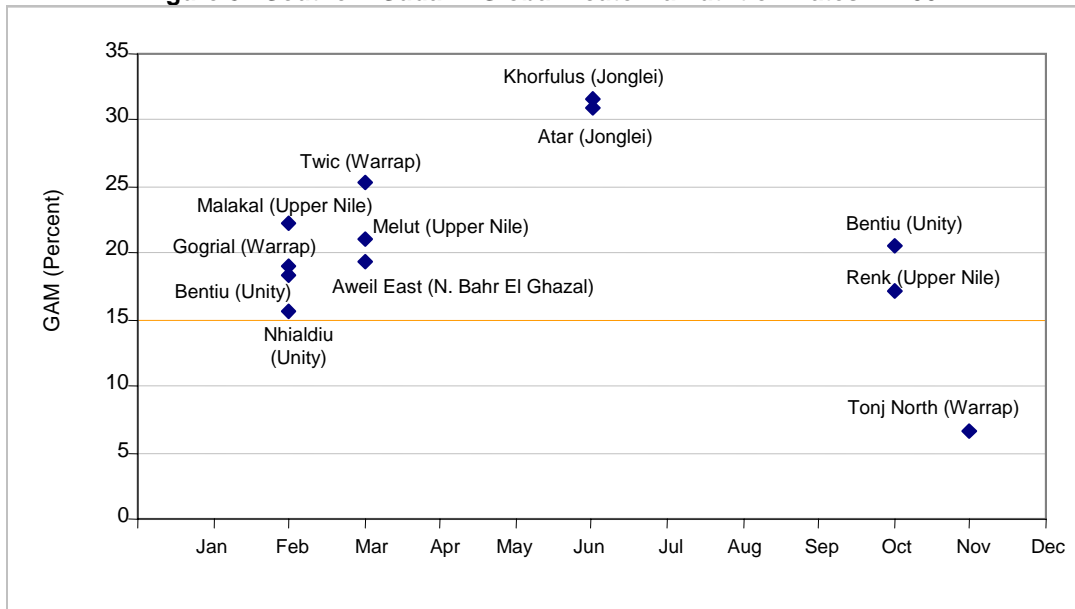
Table 11: Southern Sudan Projected Returnee Figures in 2008.

State	Total
Central Equatoria	128 773
Eastern Equatoria	24 126
Jonglei	39 276
Lakes	2 569
Northern Bahr El Ghazal	38 769
Unity	10 601
Upper Nile	17 541
Western Bahr El Ghazal	36 646
Western Equatoria	62 761
Warrap	10 937
Total	372 000

Majority of the returnees (over 80 percent) are spontaneous and depend on the resident community during their resettlement. Given the low level of coverage of the returnees' needs and the practical difficulties of tracking and targeting the returnees for interventions without causing ill will and social discontentment, community level assistance is recommended to strengthen the capacity of host areas to receive returnees. Of course, there is the need to strengthen the monitoring and tracking of returnees and boost the response capacity to reach the returnees with the minimum assistance needed to resettle and re-integrate them into the host areas.

Nutrition surveys conducted in 2007 suggest that although the nutrition situation has relatively improved compared to the conflict period, GAM rates in most areas are still above the 15 percent emergency threshold (Figure 8). This points to the need for an integrated approach that connects curative and preventative approaches, with water, sanitation, health, and agriculture sectors. The low coverage of training in basic nutrition, hygiene and childcare indicates the need to strengthen public health awareness and training as part of this integrated approach.

Figure 8 - Southern Sudan - Global Acute Malnutrition Rates in 2007



5.5 Priorities for post-recovery development

Community priorities elicited from community interviews indicate security (reported in 43 percent of the assessed villages) and the provision of basic needs such as shelter/housing (19 percent), drinking water (12 percent), education services (5 percent), tools (4.2 percent), agricultural extension (4 percent), and road repairs (4 percent) as the main priorities, which need to be incorporated in the post-conflict recovery and development priorities. For seeds and tools, where at present there is no private sector involvement because of high transportation costs, there is a need for a deliberate and concerted effort by GoSS to develop mechanisms to make these inputs available at the state level. Increased availability of tools will allow for timely land preparation, effective utilization of household labour and increased household production.

5.6 Implications for programming

The following are some implications on programming based on the results of the ANLA:

The low overall net primary school enrolment ratio of 0.62 with the lowest ratios observed in Warrap and Northern Bahr El Ghazal, point to the need to for a concerted effort led by GoSS to boost enrolment. This will require substantial investment in the rehabilitation and construction of schools, provision of school equipment and learning materials, teacher training. In such circumstances, school feeding and girls' education incentive programmes would facilitate the realization of these goals.

Likewise training in basic hygiene, nutrition and childcare is also another area of programmatic focus. Given the widespread impact of flooding this year, there is a need for a greater emphasis in the construction of flood control structures in the areas most affected by flooding.

Fishery is a vast resource which is an important source of food and income in Southern Sudan, particularly in the floodplains and along the main rivers and water bodies. Unfortunately, in the absence of formal studies on fishing, the contribution of fishing is likely to be consistently understated and underestimated in the annual livelihoods assessments. A formal study of fishing and its contribution to the household and local economy needs to be done so as to identify how this resource can be exploited more effectively.

There is increased dependence on wood fuel (firewood and charcoal) and collection of natural products as a source of income. It is inevitable that the demand of wood fuel would increase in Southern Sudan and it is crucial to establish forestation programmes to meet these needs and to mitigate the potential adverse environmental effects.

AGRICULTURE SITUATION BY ZONE (REGION)

Upper Nile Region: Upper Nile, Unity and Jonglei States

The Mission visited Malakal, Obels 2 and 3, Dulip Hill, Mohamed el Jack, Nasir and Pagak, Bentiu, Rubakona, Bor, and Akobo.

The traditional sector in Upper Nile Region (Upper Nile, Unity and Jonglei States) has been characterised this year by floods. Some 65 000 households are noted by the Mission to have been affected, substantially reducing this year's harvested area.

Upper Nile State forms the transition zone between the mechanized farming zones of north Sudan and the traditional hand-cultivated farming systems of the south. This year the Mission was unable to visit the main mechanised farming locations in Renk, however, visits to the mechanized farms around Malakal revealed an increased area over last year at 4 900 feddans (2 058 ha) of mostly highly-variable, long-cycle sorghum crop (*agono*) still very much in the vegetative stage, due to late planting in Mohamed el Jack. The area, this year, also accommodates post-water-logging (late planted), short-cycle red feterita fields, a sorghum usually sown earlier in the season to be harvested in October but will be harvested this year in December.

The tractor force in Malakal is still below the level noted three years ago but, due to improved security, more undemarcated farms have become established. These new mechanised farmers join the small group of demarcated farmers, who have kept farming over the past two years despite no access to credit and high fuel prices adding to their organisational problems.

Mechanised 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 only conducted on the more promising stands at a charge, this year, of 450 SDG for 60 feddan (US\$9/ha). 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 average around 0.66 t per ha in Mohamed el Jack. This connects to a gross margin of 59 SDG per feddan (US\$70/ha) for sorghum sold at this year's *salam* price of 35 SDG per 90 kg over ploughing, planting, fuel, weeding, cutting, threshing, transport and bags costs.

In Renk, information was only available from a telephone interview of the Director of Mechanised Farming. The Agricultural Bank has supported sorghum with a confirmed *salam* price of 35 SDG per 90 kg sack and loans appear to have been made more easily accessible to the small undemarcated farmer which would explain the tripling of the so-called <traditional> area to an area of 130 000 ha, 50 percent more than the demarcated farmers. Such information needs ratifying and more detailed information on crop performance is needed therefore a visit to Renk should be included in the north assessment to be conducted later.

No details are available regarding mechanised farming conducted in Melut and Wadkona or in the Shilluk King's fields on the west bank near Malakal.

In the traditional sector in Upper Nile State, crops in the slightly higher areas and away from the rivers/swamps have benefited from the very good rains. The early maturing *Leuwarding* and early maize crops are noted to have yielded 1.0 to 3.0 tonnes per ha in Mission spot-check observations in the Obels 2 and 3 and the settled villages of Dulip Hill. The late maturing *Agono* is also noted in good condition and so far, there have been no significant pests or diseases, 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 the main concerns expressed relate to crops lost in the floods connecting to 4 000 households in Nasir. However, in the Sobat corridor recession planting on riverbanks is a traditional farming strategy³² and is likely to be conducted extensively in the next few weeks when river levels fall.

Regarding Jonglei State, aerial observations suggest that harvesting has been completed or in progress throughout Jonglei. Armyworms early in the season were reported as present but heavy rains reduced the significance of the infestation to minimal levels. Local birds required farmers to bird scare on a regular basis. In Bor and on the way to Padak, Mission teams estimated sorghum yields at around 2.0 tonnes per ha. Similar yields were recorded at 1.5 to 2.0 tonnes per ha on many farms of 3, 4 and 5 feddans between the

³² This should be extended using feeder canals to spread the flood; and adopted elsewhere throughout the Region.

two rivers in Akobo. However, in Akoba, riverine fields around the town were still partially flooded. However, the eastern banks of the river from Akobo to Pibor were noted by aerial observations from < 300 m to be well ordered and productive, as did large block farms west of Pibor that were already harvested. Cattle camps across the vast central Jonglei swampy plain showed no signs of cultivation this year.

Regarding Unity State, in Bentiu, early crops of maize, the most important cereal in the county, were noted to have been harvested before the floods with production up to 2.3 tonnes/ha recorded by the Mission team, Crop losses in the August floods were noted 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 this year.

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

The Mission visited Aweil Town, Maluakon and Alek in North Bahr el Ghazal; Ragah and Wau in West Bahr el Ghazal; Gogrial and Tonj in Warrap and Rumbek and Cuibet in Lakes. Villages in North Bahr el Ghazal and Warrap are noted to have been flooded more than usual this year. Although not included in the UN Humanitarian Aid Flood Appeal 2007, some 21 000 households are noted in the Region, and have been recognised by GOSS, Juba as flood damaged.

In N 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 October 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 per 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 last year, or where necessary, borrowed through extended family connections. This year 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 last year is expected with spot-check samples taken by the Mission ranging around 1 to 1.5 tonnes per ha.

Again, organisational difficulties affected the performance of the rice crops in Aweil town and only 70 feddans have been grown.

In West Bahr el Ghazal, the rains were equally favourable and no adverse effects are noted. 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. Two years ago CFSAM sample crop cuts of cassava suggested yields of c.18 t/ha and sorghum yields between 1.5 to 2.0 t/ha, this year, similar yields are expected. Sorghum prices in Wau and Raja currently at 60 SDG for a 90 kg sack, are lower than last year as shown in Figure 3 and goat prices have been increasing steadily across the state since January 2006 (Figure 4).

In Lakes State, more planting on the higher land this year enabled farmers to capitalise on the reasonable rainfall, with, subsequently, no major flooding of cereal farms. Case studies conducted by Mission teams identified dry spells in July and August but of these, only lower than normal rain in the first dekad of August is 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 of 1.7 tonnes per ha are noted for the main crop sorghums being harvested 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, if the rains continue into next month (December 2007).

Equatoria: Central Equatoria, East Equatoria and Western Equatoria States

Mission visits to Equatoria this year included Tambura, Yambio, Yei, Juba, Terekeka, Torit, Kapoeta, and Ikotos.

Unlike the other two regions, only 3 000 flood-affected households have been noted by the Mission in Equatoria. These were reported to be in Torit County by the State Governments and confirmed by CRS. Elsewhere in East Equatoria all crops were noted to be performing well due to much more rain than is usual (see Figure 1) with a very even distribution. This was noted in both Kapoeta and Ikotos Counties where the

cessation of most of the obscenities perpetrated by the LRA has enabled farmers to return to their mountain fields. By the same token CRS have restarted the bullock training with 8 pairs being trained in Ikitos.

However, not all security issues are solved. Marauding bands of young men are reported to be terrorising isolated farms and cattle raiding is rife. Nevertheless, 2007 is a much improved agricultural year with yields throughout the three counties noted to be in the order of 1.0 to 2.8 tonnes per ha with no significant pests and diseases, except for a worrying spread of fungal diseases in bulrush millet in Lorime, Ikotos which warrants further investigation as nearly all plants seem to be affected. Pasture and water supply are generally excellent and the market prices of animals are rising.

Western Equatoria experienced a slightly later 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 per ha are noted by the Mission team but with greatly improved security labour is very much in demand for all manual work, including farm labouring.

Western Equatoria farms have carryover stocks from last year 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. 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 cultivation. 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 Congo or CAR were available this year.

In Central Equatoria, Mission teams visited Juba farms, Kapuri and Terekeka and flew over Terekeka several times at 300m. In the former locations, there has been a noticeable increase in planting in all directions. Crop cuts and linked observations indicate sorghum yields around 1.5 to 3.0 t/ha for both the short cycle landrace *Kelle* and *Lodoka*, the tall, longer maturing landrace that makes up the bulk of the crop. Aerial observations suggest widespread planting and well-grown sorghum crops ready for harvest throughout the riverine areas and in the hinterland of Terekeka. Team visits confirmed good crops of groundnuts and sorghum and an overall better season than 2006.

Prices in the markets, 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 10 000 tonnes of maize meal and 5 000 tonnes of roots and tubers per year. Information from the Agricultural Bank in Juba indicates no investment in larger-scale agriculture this year. The change of lending direction of southern branches other than Renk, away from *salam* has yet to result in a lending policy supporting mechanised or other farm projects. Unless such changes occur, that will initiate large-scale farming in Terekeka, Kajo-Keji, Juba and 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 quantity, the estimations noted above 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 doesn't 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.

FOOD SECURITY CONTEXT AND PROSPECTS FOR 2008

Jonglei

Jonglei State comprises of 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 metric tons of food in 2008. In addition, it is estimated that about 39 000 returnees could come back to state in 2008.

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 55-60 SDG for 90kg of sorghum (compared to 80 SDG same time last year). 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 October 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 2008.

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 metric tonnes. In addition, it is estimated that about 36 000 returnees expected to return in 2008.

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 it self, 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 South 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 metric 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 2008.

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 remain 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. The rural market centres are rapidly but the general prices of goods and services were high in 2007.

About 304 200 vulnerable people will need 13 300 metric tons 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 2008.

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 this year 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 recessionary 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 last year (one sack (90 kg) of Sorghum selling at 120 Sudanese pounds 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 metric tons 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 equatorial is now divided into – Juba, Yei River, Morobo, Lainya, Kajokeji, and Terekeka counties. It includes the green belt 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 2008, 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 the country. 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

1400mm 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 2008.

In general, the price of cassava increased from 2.2 SDG for 8kg bucket to about 6 SDG. But in Tambura the price of sorghum at 15 SDG for 10 kg is much higher than the price in Juba is at 10 SDG. This is attributed to the increased demand imposed by returnees from Central African Republic and DRC. 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 this year 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, DRC 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 Equat
<i>atari</i>						S	X	X	X	H			Ikotos
<i>kelle</i>					S	X	X	H	H				Cen Equat
<i>ladoka</i>						S	X	X	X	H			Cen Equat
Serena s. var.	X	H					S	X	X	H	S	X	West Equat
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 Equat
groundnut (2 vars)	H				S	X	X	H		S	X	X	South
					S	X	X	H					North
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 Equat
rice upland		S	X	X	X	H		S	X	X	X	H	West Equat
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