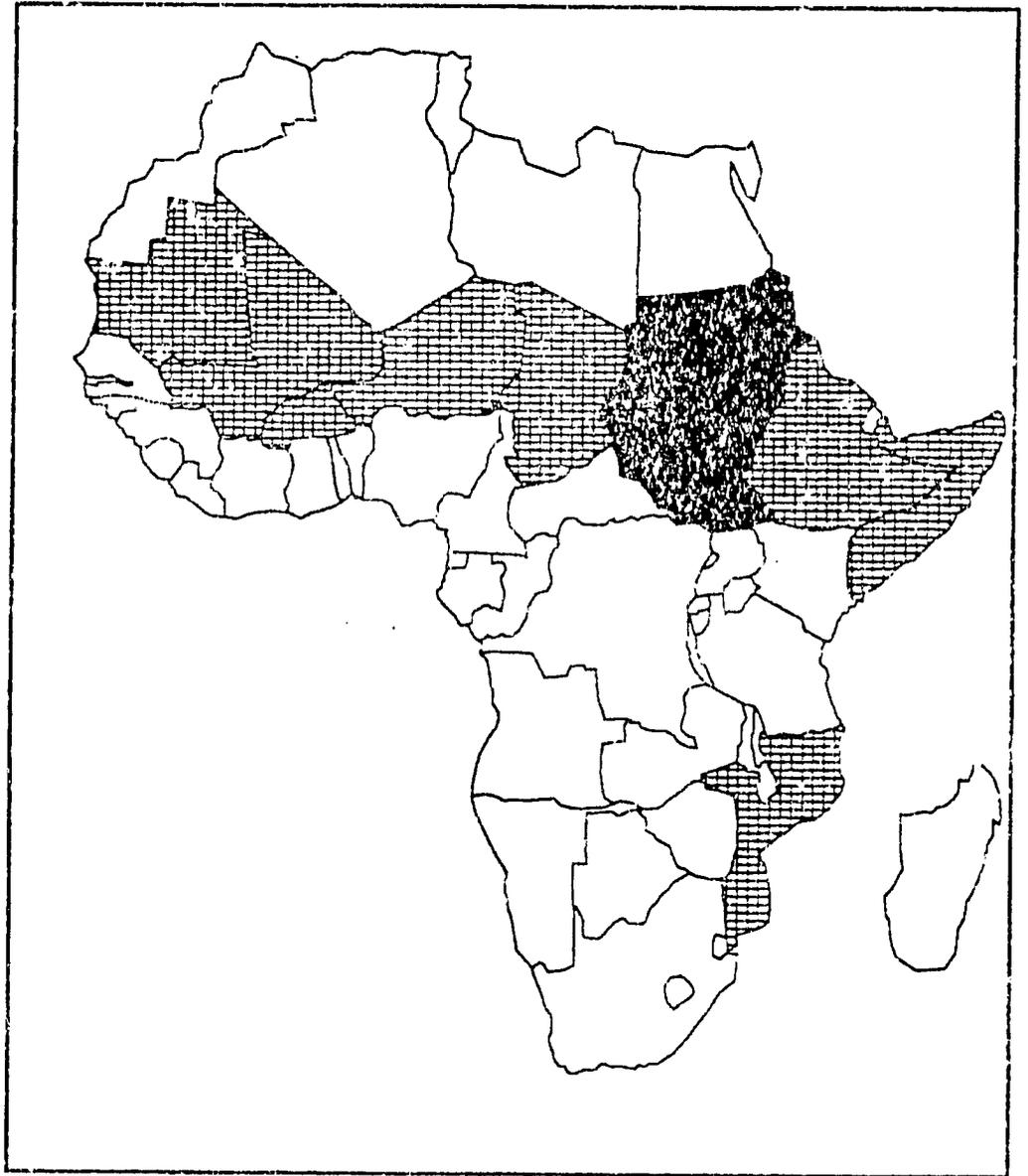


Report Number 4
September 1986

FEWS Country Report

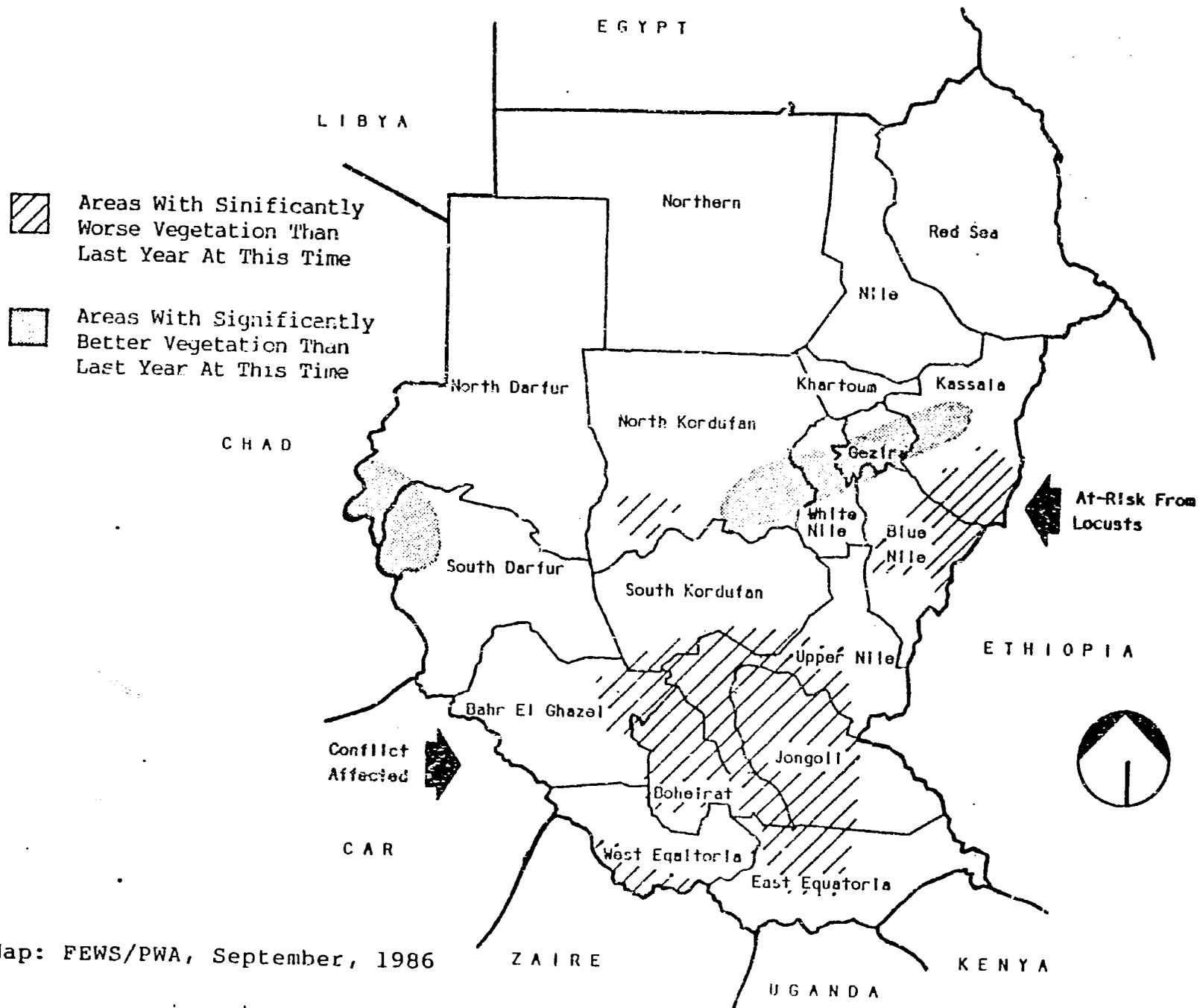
SUDAN



Africa Bureau
U.S. Agency
for International
Development

Room 105 SA-12
Washington, D.C. 20523

SUDAN: Summary Map



Map: FEWS/PWA, September, 1986

SUDAN

Locusts ?

Childhood Malnutrition.

Prepared for the
Africa Bureau of the
U.S. Agency for
International Development

Prepared by
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September 1986

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INTRODUCTION

This is the fourth of a series of monthly reports issued by the Famine Early Warning System (FEWS) on Sudan. It is designed to provide decisionmakers with current information and analysis on existing and potential nutrition emergency situations. Each situation identified is described in terms of geographical extent and the number of people involved, or at-risk, and the proximate causes insofar as they have been discerned.

Use of the term "at-risk" to identify vulnerable populations is problematical since no generally agreed upon definition exists. Yet it is necessary to identify or "target" populations in-need or "at-risk" in order to determine appropriate forms and levels of intervention. Thus for the present, until a better usage can be found, FEWS reports will employ the term "at-risk" to mean...

...those persons lacking sufficient food, or resources to acquire sufficient food, to avert a nutritional crisis, i.e., a progressive deterioration in their health or nutritional condition below the status quo and who, as a result, require specific intervention to avoid a life-threatening situation.

Perhaps of most importance to decisionmakers, the process underlying the deteriorating situation is highlighted by the FEWS effort, hopefully with enough specificity and forewarning to permit alternative intervention strategies to be examined and implemented. Food assistance strategies are key to famine avoidance. However, other types of intervention can be of major importance both in the short-term and in the long-run, including medical, transport, storage, economic development policy change, etc.

Where possible, food needs estimates are included in the FEWS reports. It is important to understand, however, that no direct relation exists between numbers of persons at-risk and the quantity of food assistance needed. This is because famines are the culmination of slow-onset disaster processes which can be complex in the extreme.

The food needs of individual populations at-risk depend upon when in the disaster process identification is made and the extent of its cumulative impact on the individuals concerned. Further, the amount of food assistance required, whether from internal or external sources, depends upon a host of considerations. Thus the food needs estimates presented periodically in FEWS reports should not be interpreted to mean food aid needs, e.g., as under PL480 or other donor programs.

FEWS is operated by AID's Office of Technical Resources in the Bureau for Africa in cooperation with numerous USG and other organizations.

SUMMARY

Reports of locusts from Sudan continue to fall short of forecasts made earlier in the year. There have been no reports of bands of hoppers or swarms of adult locusts in the primary summer breeding areas or agricultural areas of Sudan. A plausible explanation is that weather in several regions limited the anticipated buildup. The locust threat to the Sudan is now believed to come from Eritrea Region of Ethiopia, where swarms are reported in increasing numbers, from which isolated reports show limited incursions into Sudan. Should hopper (juvenile locust) bands appear in September, sufficient resources are now in place to limit their effects. The population at-risk in Sudan continues to be reported at 5,112,000 people. A new survey of childhood nutrition describes part of this population with an estimated 380,000 malnourished children under the age of five at-risk and distributed widely throughout the 12 northern provinces. Of these, 40,000 can be described as wasted (very severely malnourished). Rainfall during August was good in the primary grain growing regions and bodes well for harvest in October and November. An exception is the southernmost part of Kassala and Blue Nile Provinces and large sections of Equatoria Region in the south of Sudan.

Key Issues

- o Sudan has avoided a locust plague this summer. Vigilance is still required as the final wet season generations have still not hatched, and the possibility of an invasion from Eritrea still exists.
- o A new survey conducted in the 12 northern provinces of Sudan shows that there appears to be widespread childhood malnutrition in areas with the greatest food availability.
- o The Southern Region continues to be the area most at-risk, from a variety of causes including: drought, warfare, banditry and locusts. There is little chance for a fully accurate assessment of the food deficit situation.

September Indicators

- o The final wet-season locust generation should begin to hatch this month. Reporting on its size and the effectiveness of control measures will signal potential crop losses.
- o If rainfall continues to be good throughout September, especially in the grain growing areas of Gezira, Kassala and Blue Nile Provinces, the 1986 yields should be normal. There are persistent, unconfirmed stories that large scale farmers may have restricted the area planted to force up producer prices.

LOCUSTS

June forecasts, projecting possible plagues of African Migratory Locusts (Locusta migratoria) and Desert Locusts (Schistocerca gregaria) in the Sudan, have yet to be borne out. There yet will be, in all likelihood, major outbreaks of both species in Sudan, especially in southern Kassala Province by October. Swarms from the Ethiopian Region of Eritrea could also locally threaten Sudanese agriculture. These outbreaks, while occasioning considerable local damage, should fall short of the level of crop destruction expected during a plague year. Several events since June appear to have slowed the anticipated, summertime, locust population build-up. Nevertheless, international aid (at the levels currently envisioned) is required to meet threats of local outbreak.

Plagues arise when locust populations continue to increase geometrically from generation to generation both within a given breeding area and as the insects move from breeding area to breeding area. For example, Desert Locust populations can increase ten-fold per generation. Plagues are fueled primarily by sequences of favorable meteorological events that increase the breeding population available to increase the next generation.

Migratory Locusts in Sudan have generally been restricted to localized outbreaks dependent on local rainfall events. These outbreaks have generally been in the east, near the Ethiopian border. Migratory Locust populations normally peak at the end of the rainy season and then decline during the dry season, because eggs laid at the end of the wet season do not survive until the beginning of the next wet season, except in certain locally favorable areas where they incubate as usual. In a plague situation, swarms leaving these usual breeding areas -- due to a combination of food availability and prevailing winds and shrinking food sources -- successfully breed, giving rise to large populations that return to the important grain growing areas of Sudan at the beginning of the next growing season. Swarms can form at the end of the rainy season, without having occurred during the season, due to the concentrating effects of prevailing winds. Consumption by these late season swarms, while equal to that of the individual animals during the rainy season, will be locally more dramatic. Due to declining natural vegetation these swarms could concentrate their attention on grain crops that have not yet hardened.

Desert Locusts in Sudan follow a similar, but more common pattern. While northern Sudan holds its own

populations of Desert Locusts, most plague situations arise when these indigenous locusts are augmented by locusts migrating from the winter breeding areas of the Red Sea coast, the Arabian Peninsula and Somalia. It is when large numbers of Desert Locust breed successfully in the summer breeding areas of central Sudan that plague level populations can arise, depart for winter and spring breeding areas, and thence return once again in increased numbers the next year.

A special FAO technical meeting on 5-6 June, convened because of concerns over the potential for plagues of both Migratory and Desert Locusts, reported that "This is the first time since the 1928-42 plague that the Locusta populations produced in the summer rainfall belt in eastern Africa [namely the grain producing regions of Sudan] have reached areas receiving rain in the northern winter, which heightens the possibility that the number of Locusta present at the beginning of the 1986 summer rainy season will be much greater than in 1985....If 1986 monsoon rainfall approaches the long term average it is certain that there will be widespread gregarious breeding over much of the eastern-central grasslands of Sudan, the major sorghum growing area, which could result in substantial crop damage." The same FAO technical report raised the possibility of an upsurge in Desert Locust activity if swarms from the interior of Saudi Arabia and the Red Sea coast escaped to central Sudan, and said "rainfall conditions in the Horn of Africa are extremely favorable for Desert Locust development". Reports from Sudan during this period also pointed to the existence of high densities of locust egg pods over millions of hectares. Also in June, a consultant to the European Economic Community's (EEC) detailed the material requirements for meeting this locust threat. Implicit in his scheduling of deliveries of materiel was a schedule for action, which began on or about the first of August.

Gregarious breeding of Migratory Locusts in central Sudan has not been reported. Breeding swarms of Desert Locusts do not appear to have arrived there from the Red Sea coast or the Arabian Peninsula. There have been no observations of large numbers of locust that would have been produced by reported egg masses. If, in fact, no news was good news, locust populations probably did not build-up to the levels originally envisioned in June. What remains is for the final (and largest) rainy season generation to hatch (late summer to early fall), eat, and breed. During the harvest period, the Desert Locusts should begin to swarm, and migrate to the winter breeding grounds in southeastern Ethiopia and Somalia. (See Map #!).

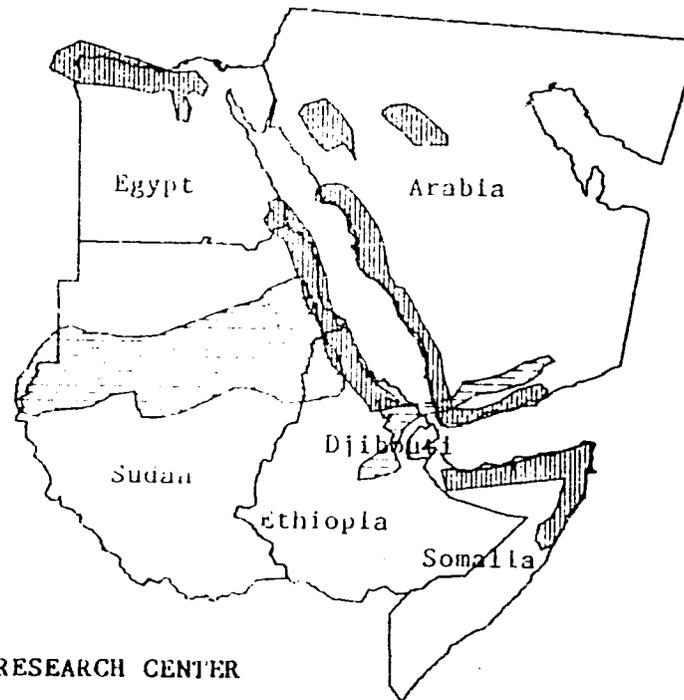
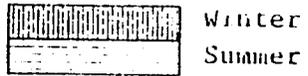
There are several possible reasons why potential plagues did not materialize this year. First, the high densities of egg masses reported early in the summer (primarily Migratory Locust) might not have been viable, having been laid at the end of last year's infestation, and did not hatch after the prolonged dry season. Second, the EEC suggests that when rains did come they were enough to waterlog egg masses. And third, anticipated swarms of Migratory and Desert Locust did not migrate to central Sudan for the summer breeding season (which could have given rise to plague conditions) because meteorological conditions in the winter breeding areas were not as favorable as had been projected, or control measures were effective.

Local destructive outbreaks of both Migratory and Desert Locust activity are still likely, but will be orders of magnitude less than feared in June. Medium to high densities of grasshoppers, Migratory Locusts and Desert Locusts were reported in the agricultural areas of southern Kassala Province in mid-August. These were not reported as displaying gregarious behavior characterizing an incipient swarm. Other important agricultural areas in Sudan also report locusts, but again not yet displaying the gregarious behavior indicative of swarming. September is the latest that hopper bands could appear and locally threaten Sudanese Agriculture, both as juveniles and later as adult locusts assembling into swarms. Resources are in place to deal with the appearance of hopper bands in September in the primary agricultural areas. Unconfirmed reports from Sudan of Desert Locust swarms in Eritrea indicate the possibility of an additional threat to Sudanese areas along the Ethiopian border.

The only area currently clearly identified as at-risk from locust activity is the important grain growing area around Gedaref in southern Kassala Province. An outbreak in Gedaref may cause heavy, localized damage, but even at worst would produce much less crop loss than a plague year would occasion for Sudan as a whole. Finally, given the control resources currently in place, locust destruction could, in the end, be only a minor factor in the ultimate production of the region.

SUDAN MAP 1 · DESERT LOCUST SEASONS

SUMMER AND WINTER BREEDING AREAS FOR DESERT LOCUST SWARMS IN THE REGION
SEASON



SOURCE: ANTI-LOCUST RESEARCH CENTER
FEWS/PWA

RAINFALL AND VEGETATION

Assessments of rainfall in Sudan during most of August show generally normal levels throughout most of the country, and above normal levels in northern Blue Nile Province and to its east. Nonetheless, areas of Kassala Province in southern Gedaref District, and southern Blue Nile Province have below normal cumulative rainfall totals. This is an important area for grain production. Below normal rainfall totals are also assessed for North Darfur and North Kordufan Provinces and large parts of Equatoria Region in southern Sudan.

Vegetation indices, based on satellite images made from August 10-20 (See Images 1 and 2), show generally positive changes for the country, compared to vegetation at the same time last year (which was about normal, although producer action resulted in record harvests). Based on these indices the prospects for the 1986 harvest are generally good to excellent in Sudan.

Exceptions are a large area in southern Gedaref District in Kassala Province and in southern Blue Nile Province, where a lack of rainfall early in the season severely stressed vegetation. Planting in this area was delayed, with the rains, and agricultural production could show a better result than would be forecast from the vegetation indices alone (which contain both natural and cultivated vegetation). Other areas showing vegetation indices much lower than last year are central El Nahud District in western North Kordufan Province and most of Equatoria Region.

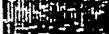
A broad band of vegetation indices better than last year extend from New Halfa District in Kassala Province southwest through northern Blue Nile Province, across central White Nile Province and into southern North Kordufan Province as far west as El Obied District. Other areas of showing vegetation indices better than last year include southwestern North Darfur and the Jabal Merra area (usually a surplus producing zone) in the northwest of South Darfur Province. All of these areas are historically important agricultural areas and improved vegetation indices there bode well for Sudanese agriculture as a whole.

SUDAN IMAGE 1:

Negative Vegetation Index Changes, August 10-20, 1986
As Compared To The Same Period Last Year

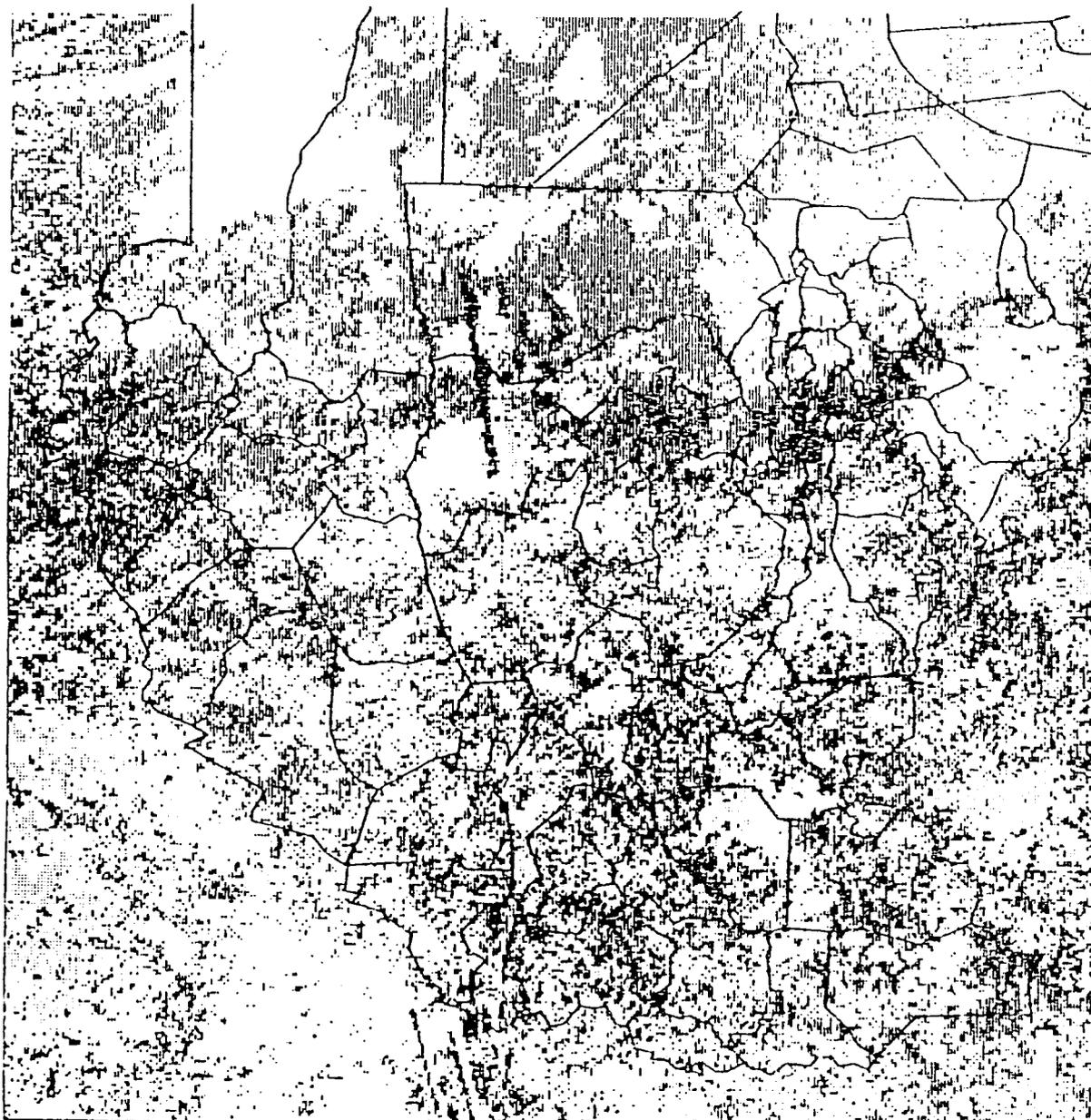


SOURCE: NOAA

	92669	66.3134%	No Change, or Positive Change
	16369	11.7136%	Clouds in Either Image
	15296	10.9414%	1 Category Decline
	7476	5.3498%	2
	3955	2.8302%	3
	2168	1.5514%	4
	1817	1.3002%	5 or more Category Decline

FEWS/PWA

SUDAN IMAGE 2: Positive Vegetation Index Changes, August 10-20, 1986
As Compared To The Same Period Last Year



SOURCE: NOAA



72585	51.9414%	No Change, or Negative Change
16369	11.7136%	Clouds in Either Image
29309	20.9734%	1 Category Improvement
11854	8.4827%	2
5724	4.0961%	3
2386	1.7474%	4
1517	1.0856%	5 or more Category Improvement

FEWS/PWA

CHILDHOOD MALNUTRITION

A survey of 24,000 children under the age of five, conducted throughout the 12 northern provinces of Sudan, shows widespread malnutrition, even in areas of grain surpluses. (See Maps 2 and 3) The Sudan Emergency and Recovery Information Surveillance System (SERISS) under the Ministry of Health performed the survey during May and June in 167 Village (rural), Sector (urban) and Farig (nomadic) Councils, the lowest administrative units in Sudan. SERISS used a common questionnaire and common measurement methods to assess the nutritional status of these children.

Children were compared against an accepted standard of the ratio between weight and height for well-nourished children. Children below 80% of that standard are considered malnourished and at-risk. Children below 70% of that standard are considered very severely malnourished and are often described as wasted and at-risk of death without prompt nutritional intervention. The drought of 1984 produced levels of malnutrition even higher than those reported here. While there is no information on "normal" levels of childhood malnutrition in Sudan, it must be stressed that reports of any children less than 70% of the standard is a high level. According to the Center for Disease Control levels above 2-3% of children less than 80% of the standard are also high. This means that Sudan as a whole has extremely high levels of childhood malnutrition. It is only in comparison to the even higher levels reported from the drought of 1984 that these figures appear favorable.

FEWS' analysis of this survey has produced some disturbing results. The most disturbing result is the widespread nature of childhood malnutrition in Sudan. A second feature is (with the exception of South Kordufan) the greater rural than urban prevalence of childhood malnutrition. When mapped to the district level (see Maps 3 and 4) the even distribution of malnutrition is more clear. Only in Gezira Province do pockets of good nourishment stand out. Strangely, there is a slight positive correlation ($r=.33026$) between the percentage of rural children in a province who are malnourished and the per capita production of food grains. This bizarre result, while not statistically significant, does point to the existence of high levels of childhood malnutrition in areas of high per capita production.

TABLE 1: Childhood Malnutrition in Northern Sudan
(Under 5 Years of Age)

PROVINCE	Est. 1986 Population	% Children <5, Below a Standard WT/HT Ratio				Est. Number of Malnourished	
		Rural		Urban		Children	
		<70%	<80%	<70%	<80%	Rural	Urban
KHARTOUM	2,092,536	2.1%	15.3%	1.0%	8.8%	14,860	24,992
NORTHERN NILE	444,898	.3	8.8	1.0	5.0	6,228	498
RED SEA	1,176,755	1.4	9.5	1.0	8.6	14,789	5,057
KASSALA	799,829	2.0	11.7	1.5	7.2	11,109	3,654
BLUE NILE	1,655,541	1.8	17.0	1.0	11.5	38,133	8,864
GEZIRA	1,152,163	1.4	11.3	1.5	10.1	18,903	4,252
WHITE NILE	2,266,498	1.2	11.3	0.0	6.8	38,929	4,733
N.KORDUFAN	1,056,593	1.0	15.6	1.0	13.8	21,375	7,719
S.KORDUFAN	1,823,065	1.2	10.1	1.4	6.4	29,193	2,758
N.DARFUR	1,391,277	0.6	9.9	0.6	14.4	22,179	4,347
S.DARFUR	1,632,837	1.3	15.2	1.0	13.0	40,105	4,473
S.DARFUR	1,990,044	2.0	14.5	0.5	14.4	47,761	4,808
TOTAL	17,482,036					303,555	76,155

*Includes Nomadic children weighted by their percentage of the total rural population.

SOURCE: FEWS Analysis of SERISS data.

Children under five years of age are estimated to make up roughly 18% of the total population of the Sudan. While the exact distribution is unknown this figure was used to estimate the number of children in this age group that are clearly at-risk. The total number of seriously malnourished urban and rural children under 5 years of age in northern Sudan is estimated at 379,710 (See Map 2).

The high levels of urban malnutrition in North and South Darfur and in South Kordufan, and the high levels in rural North and South Darfur, exist in spite of the distribution of emergency food aid. It is clear that the numbers of children under 5 that are malnourished in these areas are not the only ones at-risk. There are older children and adults who must also be malnourished and at-risk. And, there are an additional number of their age peers, older children and adults who would also likely be malnourished in the absence of emergency food aid. These people must also be counted at-risk. In North Kordufan Province, the relatively low levels of childhood malnutrition must be a tribute to the massive

and successful distribution of food aid, especially in towns (rural malnutrition there might be understated due to the relative health of the one sample of nomads in the survey, who were weighted according to the relatively large proportion of nomads in the total rural population). Alternatively, previous reports of malnutrition, and reports of the number of people at-risk in North Kordufan Province could have been overstated. This appears unlikely given the general level of nutrition in Sudan as well as the number and detail of health, nutrition and agricultural assessments coming out of the Province.

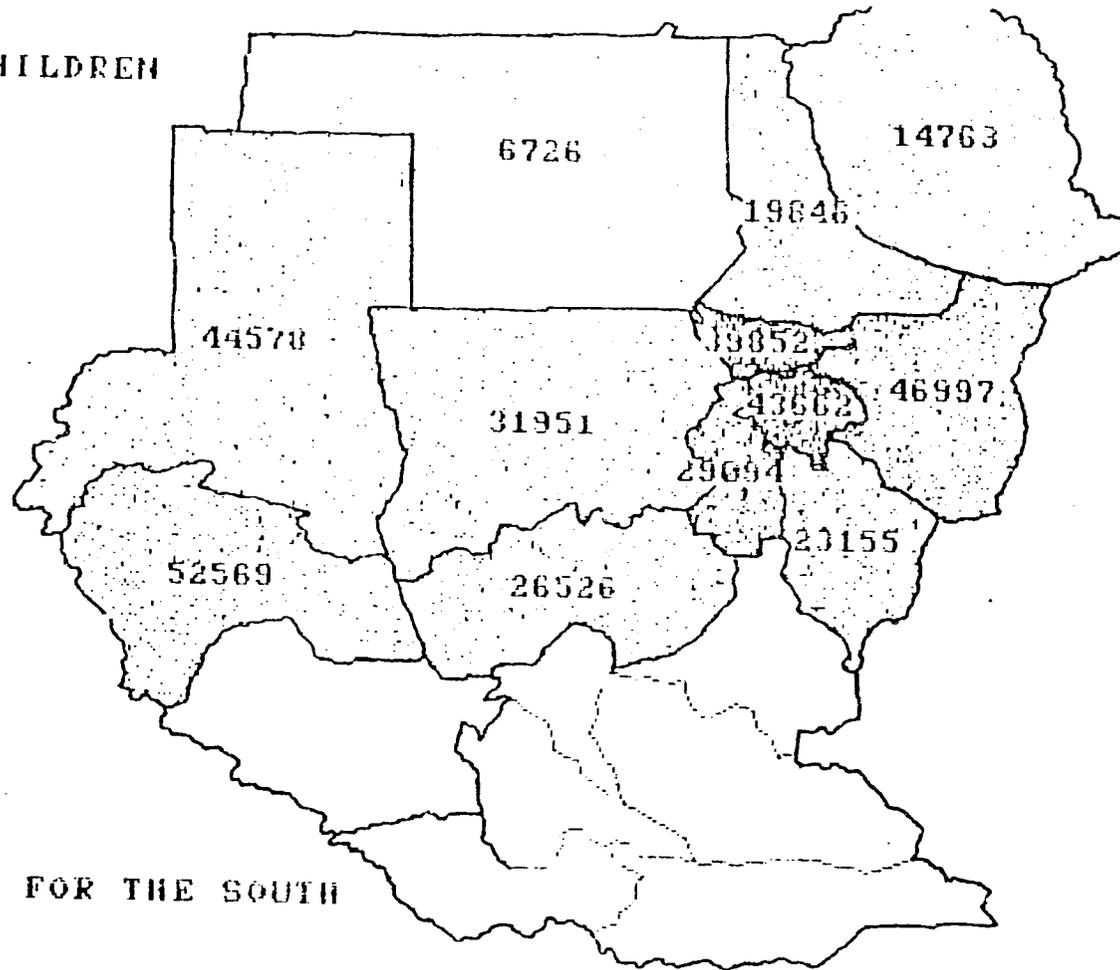
The biggest surprise of the survey was the relatively high percentage of urban and rural children found malnourished in the provinces of Blue Nile, White Nile, Kassala and rural Gezira Province. These four provinces make up the granary of Sudan. The record production and surpluses there in 1985 suggest that malnourishment was avoidable. Malnutrition in Kassala is the highest found in the survey. A single village in the sample showed 39% of the children at less than 80% of the weight/height standard. While not all of Kassala is a granary, high levels of malnutrition were found throughout the Province. Rural children do not have access to the surpluses available either locally or provincially.

Policy makers might consider increasing food aid flows to North and South Darfur, South Kordufan, rural Khartoum and rural Red Sea Provinces to raise the nutritional levels of children there. It would also be prudent to maintain current levels of food aid in North Kordufan and act to free up the distribution of provincial reserves in Gezira, Blue Nile, White Nile and Kassala Provinces. Food aid organizations, such as Save the Children in Darfur Region and Care in Kordufan Region plan to cease food distribution in October. These survey data point to a continuing need in just those areas and it is unclear that alternative relief activities by the Sudanese are planned.

Map 2

ESTIMATED CHILDREN AT-RISK IN SUDAN NUMBER OF CHILDREN UNDER 5 YEARS CONSIDERED AT-RISK FROM MALNOURISHMENT

EACH DOT=100 CHILDREN

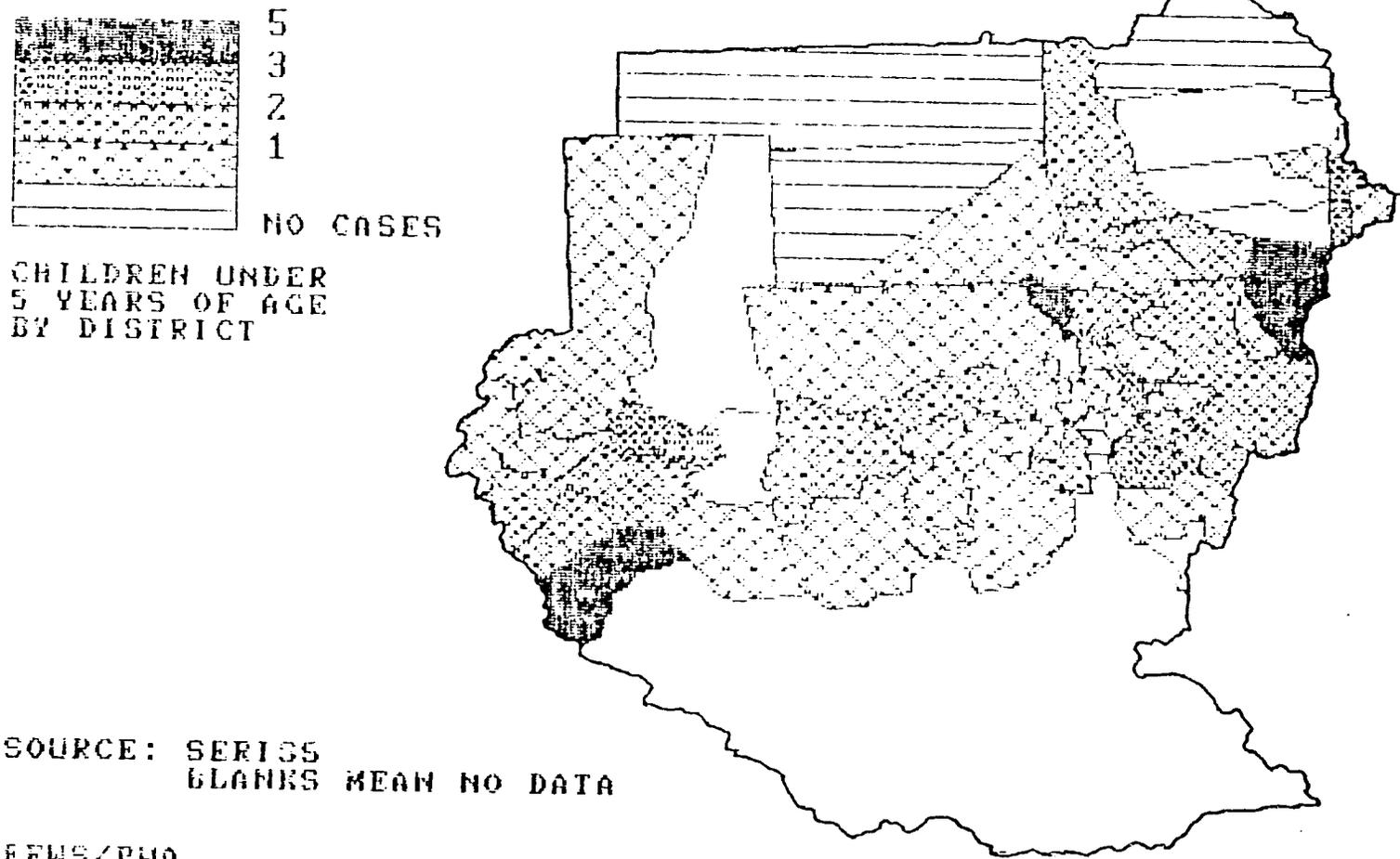


SOURCE: SERISS
NO DATA FOR THE SOUTH

FEWS/PWA

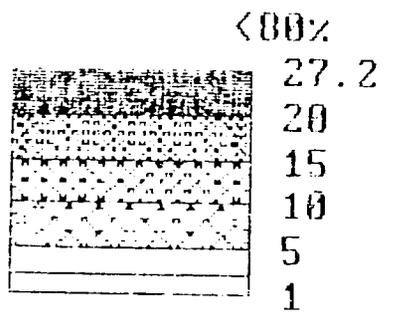
Map 3

Estimated Rural Childhood Nutrition
Percent of children (<78% of a standard wt/ht ratio (severe acute malnutrition))

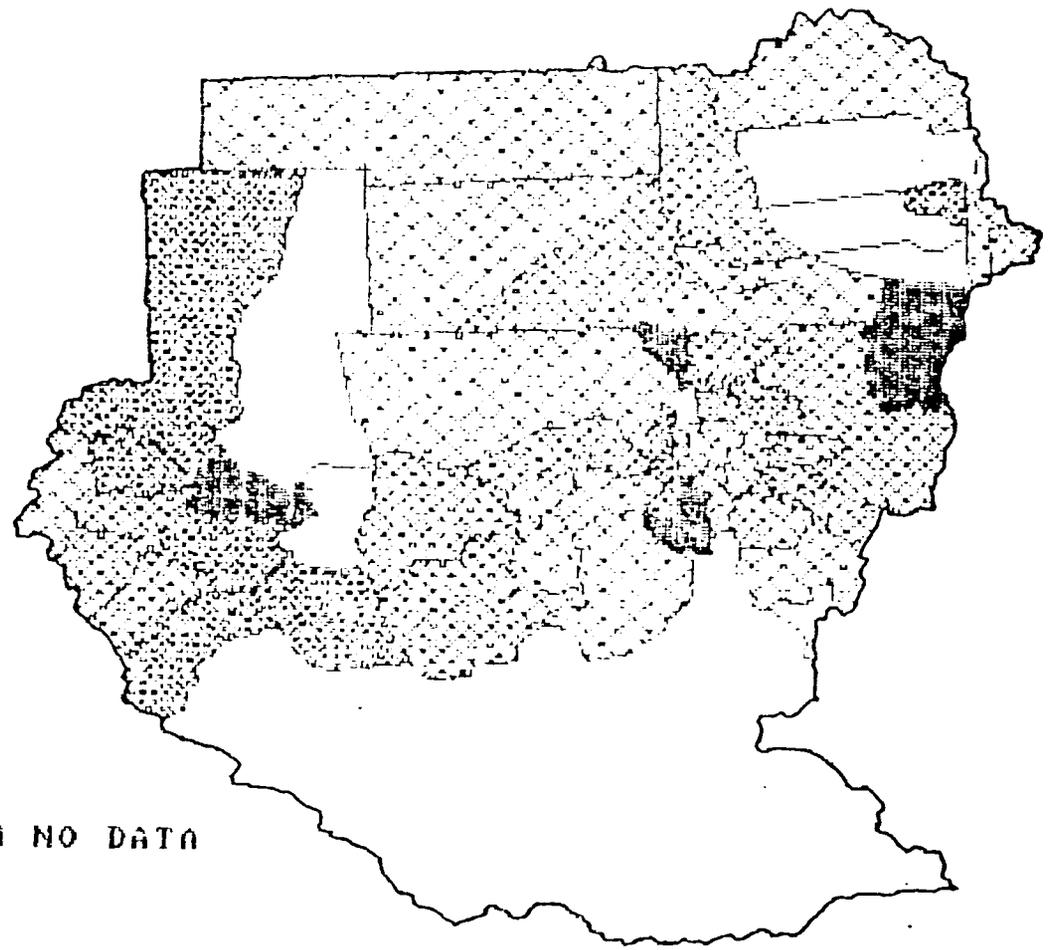


Map 4

Estimated Rural Childhood Nutrition Percent of children <80% of a standard wt/ht ratio (severe malnutrition)



CHILDREN UNDER
5 YEARS OF AGE
BY DISTRICT



SOURCE: SERISS
BLANKS MEAN NO DATA
FEWS/PWA

SOUTHERN REGION

The situation in the Southern Region of Sudan has not improved materially from that reported in previous FEWS Reports. Indications are that the situation has deteriorated slightly in Wau, where 60% of the population is reported as malnourished. Added to previously existing problems is that of a growing drought in Equatoria Region. Dry weather in August has harmed crops that were planted late to replace crops damaged by a shortage of rain earlier in the summer. Among displaced persons along the Kenyan border (Nasua camp) journalists' report gross malnutrition comparable to levels found in Ethiopia during the height of the famine there.

The flow of food aid to the Southern Region is still problematical. The city of Juba was reported to have received a convoy of 204 truckloads which included sufficient food aid to assist displaced people there for about three weeks, and to enable private voluntary organizations (PVOs) to renew their relief operations in the immediate hinterland. PVOs are purchasing food, primarily beans, from northern Western Equatoria Province for distribution in Eastern Equatoria Province. Unfortunately, Uganda is reported to have closed its borders to the flow of food aid claiming that former Ugandan military, operating in the Equatoria Region of southern Sudan, were diverting aid for their own use.