

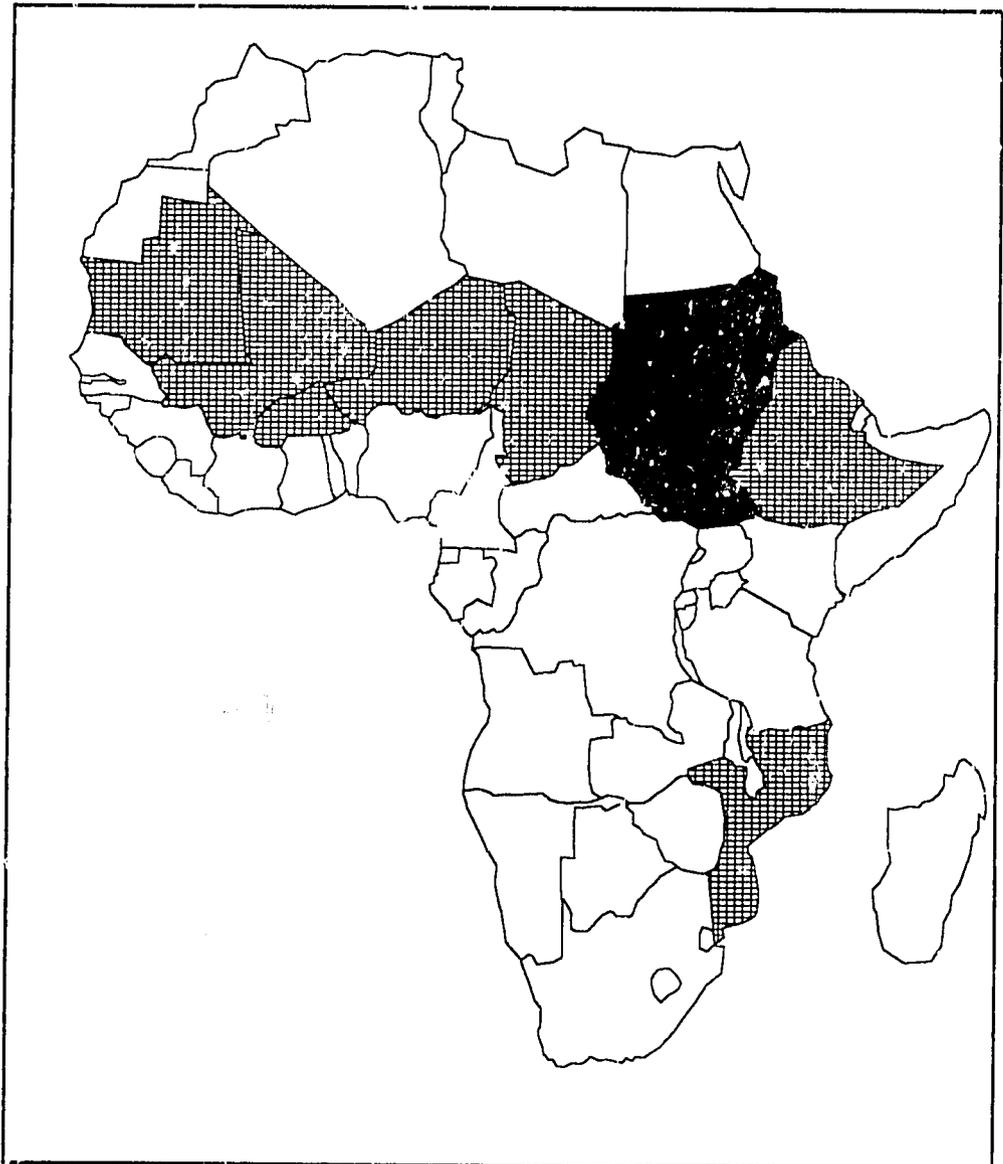
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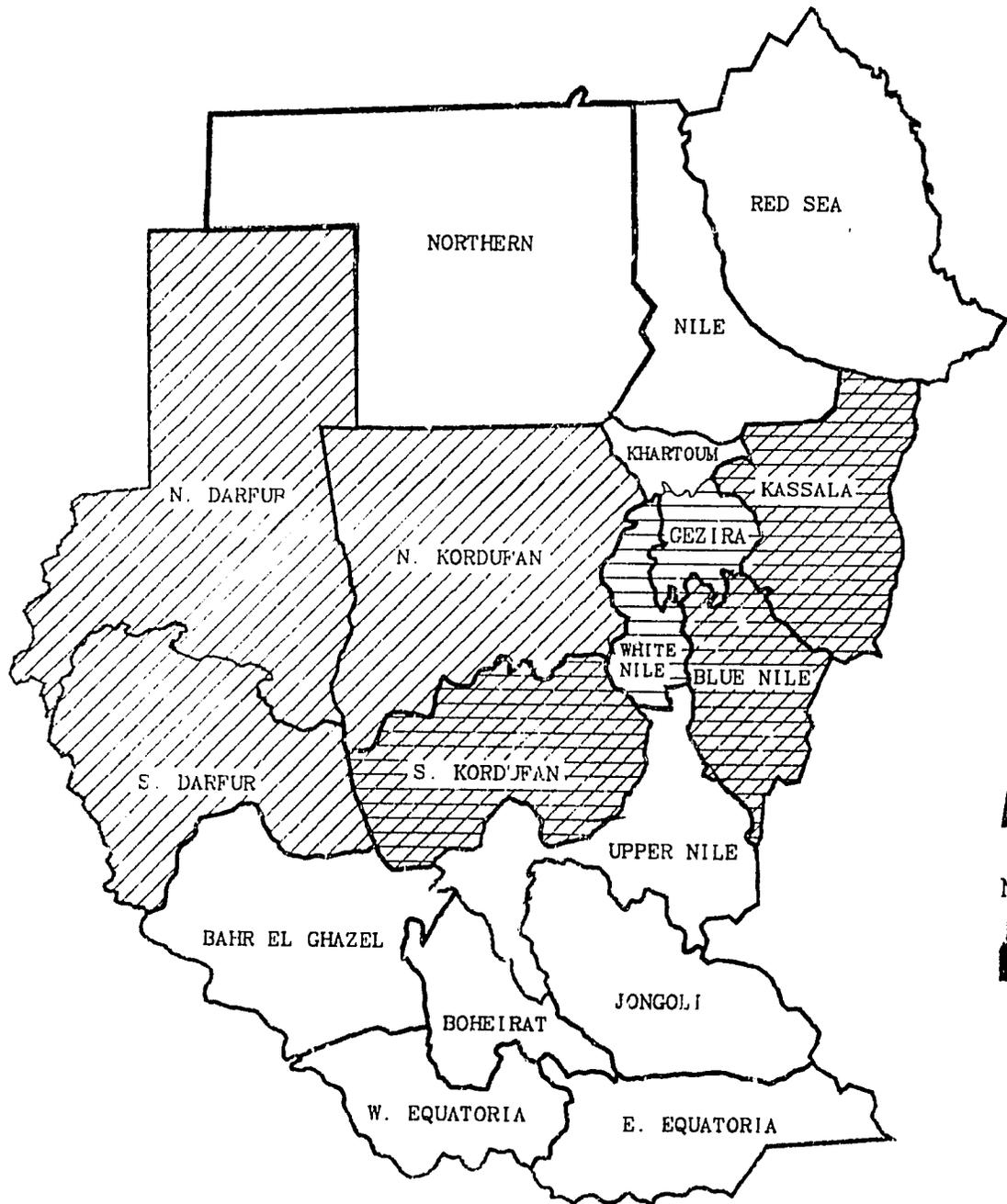
FEWS Country Report

SUDAN



Africa Bureau
U.S. Agency
for International
Development

Summary Map



-  Provinces with poor prospects for cereal yields
-  Important cereal producing areas

SUDAN

Food Supply At Risk

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

Prepared by
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October 1987

Contents

Page

| | |
|----|----------------------|
| i | Introduction |
| 1 | Summary |
| 2 | Darfur |
| 8 | Kordufan Region |
| 9 | National Food Supply |
| 13 | Southern Region |

List of Figures

Page

| | | |
|----|--------------|--|
| 4 | Map 1: | North Darfur Agricultural Prospects |
| 5 | Figures 1-4: | North Darfur, Seasonal Vegetation Trends |
| 7 | Map 2: | Childhood Malnutrition |
| 10 | Map 3: | Central and Eastern Agricultural Prospects |
| 11 | Figures 5-8: | Central and Eastern Seasonal Vegetation Trends |
| 12 | Table 1: | Rainfall Station Data |

INTRODUCTION

This is the sixteenth in a series of monthly reports on Sudan issued by the Famine Early Warning System (FEWS). 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 does not collect primary data. Rather, it receives information from various domestic U.S. and international agencies and private voluntary organizations, and from government agencies in the countries under study via in-country FEWS Public Health Advisors. The information is then examined, compiled and analyzed for its predictive potential. Without the ongoing cooperation of all these organizations, FEWS could not function.

In particular, this report owes a debt to various offices of the US Agency for International Development (AID), Department of Agriculture (USDA), National Aeronautical and Space Administration (NASA), National Oceanic and Atmospheric Administration's National Environmental Satellite, Data, and Information Service (NOAA/NESDIS), the NOAA/NESDIS Assessment and Information Services Center (AISC) and USAID/Nouakchott; the Government of Chad (GOC) Ministry of Food Security and Displaced Persons (MSAPS), Crop Protection Service (CPS), and multi-ministry-donor-PVO Food Action Committee (CASAD); the multi-donor funded Agro-Hydro-Meteorological Center in Niger (AGRHYMET); the European Agency for Development and Health (AEDES); the UN World Food Program (WFP); the Cooperative Institute for Applied Meteorology (CIAM) at the University of Missouri (in conjunction with NOAA/NESDIS); and CARE.

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SUMMARY

This year's grain harvest in Sudan will be significantly worse than that of 1985 or 1986. Detailed analysis of Normalized Vegetation Index (NVI) images shows crop areas in North Darfur Province as highly stressed, seemingly with little chance of reasonable yields, even from drought-resistant replacement crops. In South Darfur the agricultural situation has improved from earlier in the season, nevertheless grain production will be poor as farmers switched to cash crops to cope with the drought. The crop situation in North Kordufan is worse than previously believed. In both North and South Kordufan, cereal production will be poor, in part due to late season plantings of cash crops to offset earlier losses of cereal crops. Of great concern is the possibility of a significant decline in national cereal production due to an extremely early end to the rainy season (as evidenced in NOAA AVHRR satellite data) in Kassala and northern Blue Nile Provinces. Rainfall during September at Gedaref (in Kassala Province) was only 44 mm (compared to the historical average of 100 mm). One report suggests total production in Gedaref will be reduced 50% from the levels of 1986. This alone would account for a 15% decrease in national grain production. This forecast is reinforced by a report of reduced acreage and yields in the mechanized farming areas of Sudan. The condition of stored grain throughout Sudan is also a focus of concern. If a large proportion is found to be unfit for human consumption, the ability of donors to purchase food aid within the country would be compromised. The United Nations High Commissioner on Refugees (UNHCR) in Sudan estimates that up to 100,000 additional Ethiopian refugees will enter Sudan as a result of the current drought in northern Ethiopia. An influx of this magnitude could severely tax the Sudanese government.

Issues

- Satellite imagery, coupled with a World Food Program (WFP) reference to stressed crops in Kassala Province, a report by the Mechanized Farming Corporation that acreage and yields will decline this year, and poor September rainfall in eastern Sudan, suggests that national sorghum production will be significantly reduced from 1985 and 1986 levels. This reduction -- if true -- could severely limit potential exports, employment opportunities in the area, the ability of donors to purchase emergency food aid in-country, and the ability of rural people to purchase grain from savings and the proceeds of cash crops.

- The condition of vast quantities of stored grain in eastern and central Sudan is now under investigation. The finding that a significant proportion is unfit for human consumption would severely compromise Sudan's ability to absorb reduced production this year. It would also affect export potentials, grain prices and the ability of donors to purchase food aid locally.
- The Sudanese government, in anticipation of possible shortfalls in production, has banned grain exports. The USAID Mission has questioned the effectiveness of this ban.

Indicators

- An aerial survey of crops in North Darfur and North Kordufan Provinces is scheduled to begin on November 1. The ground component of this survey began on October 5.

DARFUR

Darfur Region is still an area of great concern. Detailed analysis of NVI data shows a significant probability of poor production in most of the agricultural areas in North Darfur Province and in parts of the northern districts of South Darfur Province.

Satellite imagery and rainfall reports suggest an early end to rainfall limited any recovery of stressed crops and probably destroyed the possibility of significant yields from many alternate crops (e.g., groundnuts and sesame sown in response to the failure of millet and sorghum) in North Darfur. Farmers are reported to be selling livestock to obtain cash for future food purchases. In South Darfur, September rains should have been sufficient to provide decent yields from alternate cash crops planted in reaction to the drought. Nevertheless, cereal production in South Darfur should be poor. Grain prices should rise in 1988 in response to both local and national shortfalls in grain production -- limiting the grain purchasing power of those farmers able to obtain a decent harvest of cash crops. Detailed reports of May-July childhood nutritional status by location, when combined with these agricultural prospects, locate the populations in North Darfur most at-risk in El Fasher, Mellit and Umm Keddada Districts. Grain prices continue to rise in Darfur Region.

An October 15, 1987, report from the Sudanese Commission on Relief and Rehabilitation (RRC) Early Warning System states that no harvest is expected in North Darfur except in a few pockets to the east of El Fasher and adds Kutum District to those at risk. Umm Keddada and Mellit Districts are reported to face serious shortages of water

for human and animal consumption. Pasturage is said to be poor.

The RRC's assessment of the situation in South Darfur is relatively better. They suggest that, while crop prospects are worse than in 1986, prospects are generally better than in 1984.

Pests

Adding to Darfur Region's drought problems are significant infestations of pests, including Desert locusts, grasshoppers and millet headworms. Desert locusts, especially, threaten remaining crops and pasturage. Control activities, currently underway, should help to lower the threat of Desert locusts, but their damage will exacerbate the emergency situation.

Vegetation

Satellite imagery shows a generally late start to and early decline in vegetative vigor throughout the agricultural areas of North Darfur Province. As shown in Map 1, the yield prospects of agricultural zones within the Province are poor or worse, with the exception of a small area of rainfed agriculture in northern El Geneina District (along the Chadian border), and the terraced and irrigated cultivations (on the slopes of the Jabel Merra) in Kebkabiya and Kutum Districts, where agricultural practices could possibly overcome the poor and poorly timed rainfall evidenced by NDVI. Figures 1-4 show graphs of 1987 vegetative vigor compared to the historic minimum, average and maximum for selected areas within the province. While the state of the art does not yet allow precise statements as to the relationship between NDVI and crop yield or production, these graphs do illustrate, through the response of vegetation, the general length of the growing season and the timing of rains. The impact of these events on crops can then be inferred from other agronomic knowledge.

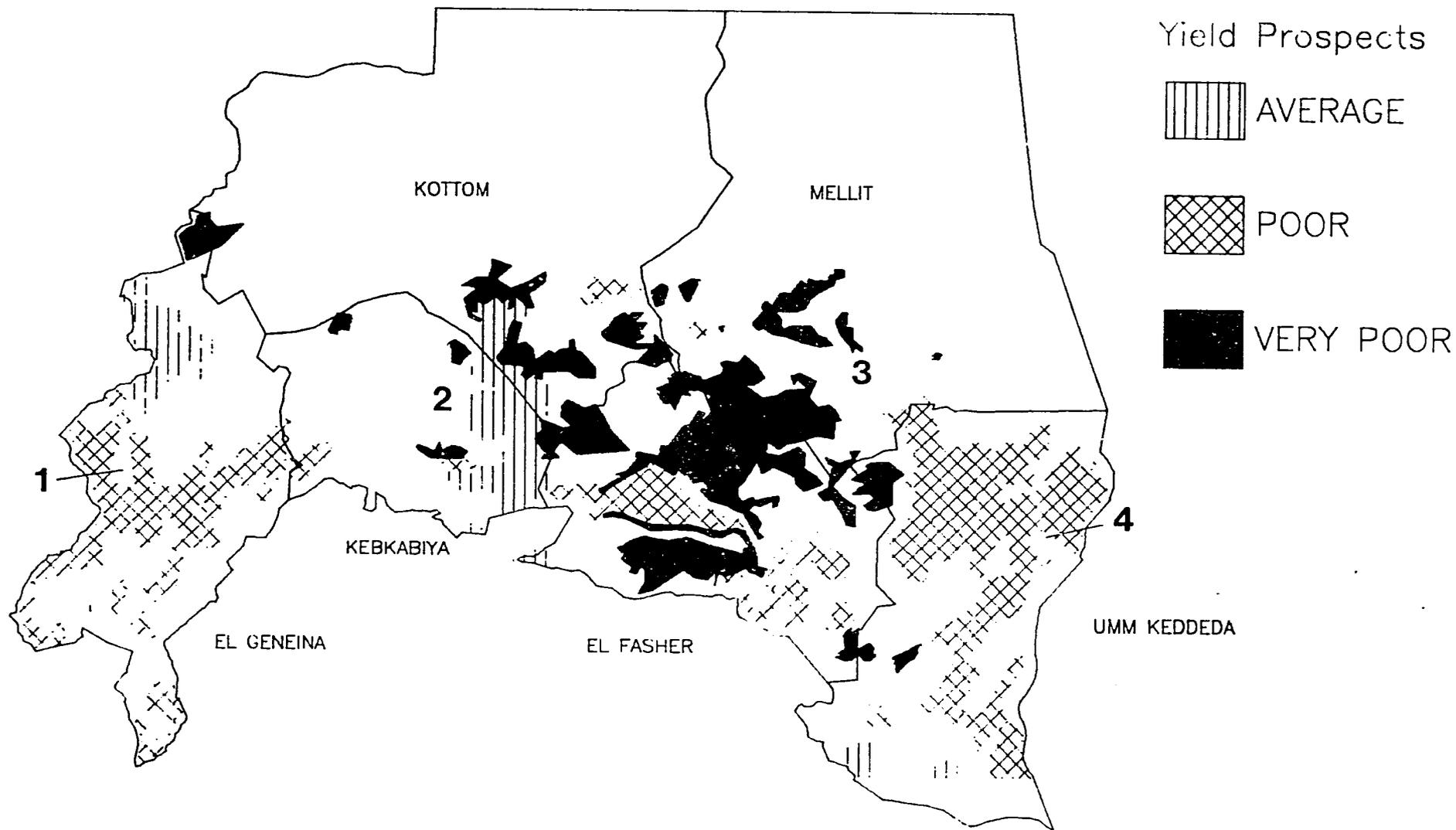
In South Darfur the agricultural situation, inferred from satellite imagery, has improved. The terraced and irrigated areas of the Jabel Merra, as well as Buram District and the southern half of Ed D'aïen District, should have good yields. Early crop stress could limit potential yields in Zalingei and eastern Mukjar Districts. Yields of rainfed agriculture in eastern Nyala and northern Ed D'aïen Districts would probably be poor, except that Nyala appears to have received adequate rainfall during September to allow decent yields from alternate crops.

Rainfall

Rain gauge data from Darfur Region is not reported consistently, but NOAA assessments of satellite imagery suggest little or no rain fell north of 12° after

NORTH DARFUR PROVINCE: Agricultural prospects in cultivated areas. Inferred from satellite imagery of vegetative vigor and growth curves.

MAP 1: SUDAN



SOURCE: NOAA AVHRR/NASA IMAGERY

MAP: FEWS/PWA, OCTOBER 1987.

Changes In Normalized Vegetation Indices 1987 Compared To The Historical Average, Maximum & Minimum

Map 1 locates the area represented by each figure

Figure 1

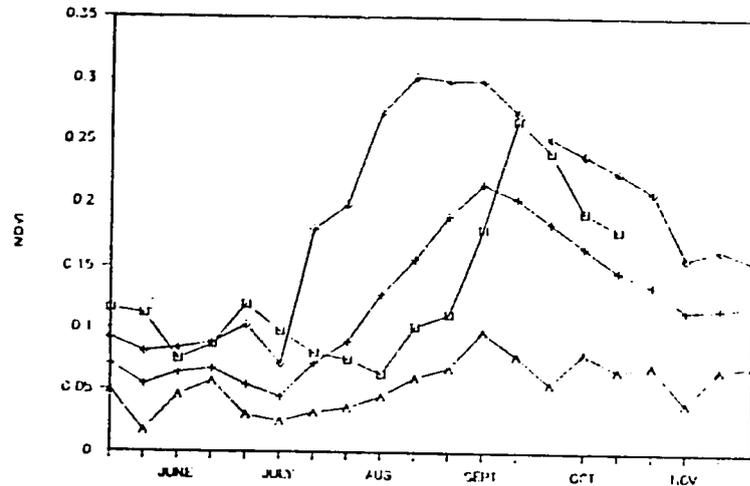
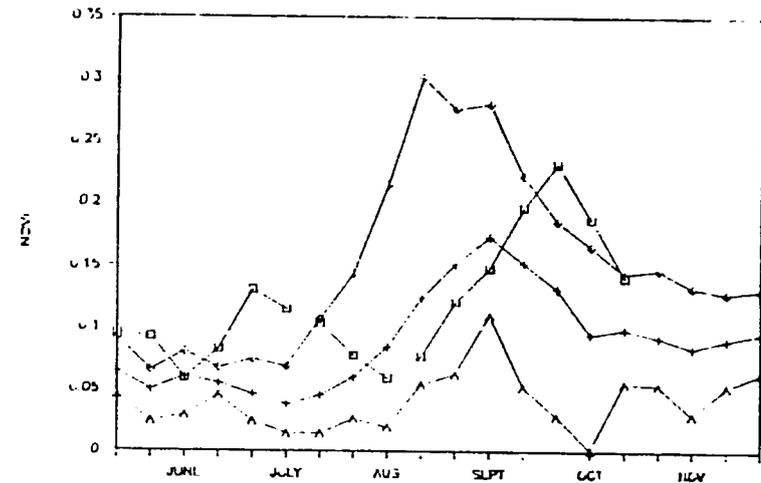


Figure 2



Legend

- 1987
- + AVG.
- ◇ MAX
- △ MIN

Figure 3

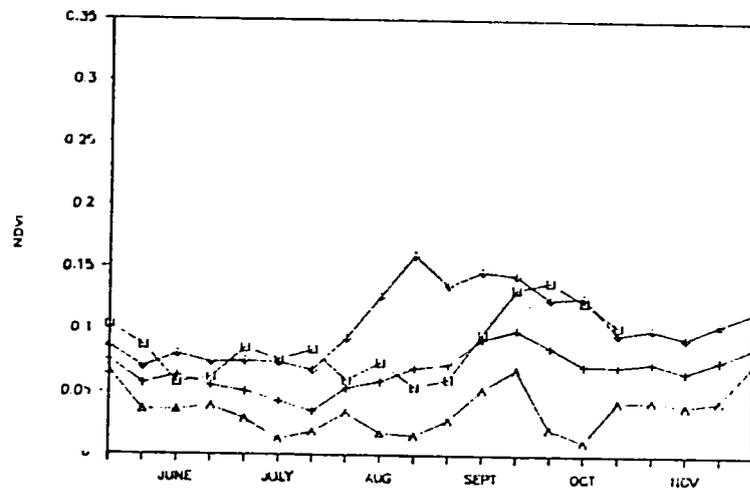
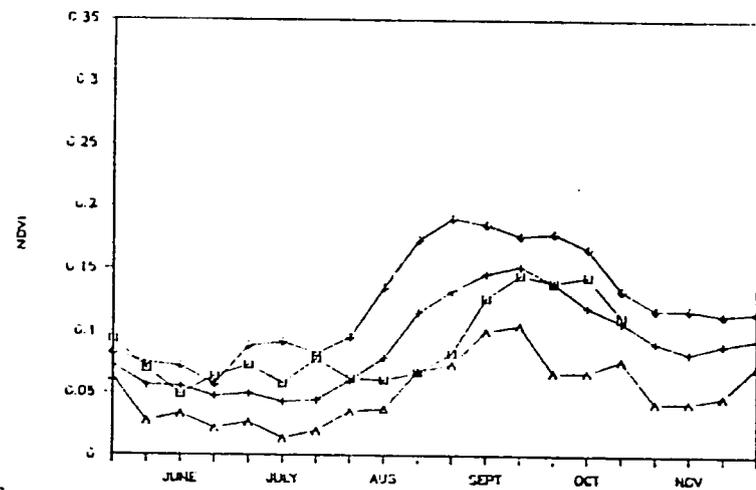


Figure 4



September 12, 1987, and rain may have ended earlier than that. If this is true, the agronomic implications are very poor. Normally, grain is filling during the last half of September. In the case of severely drought affected areas, where late or repeat plantings occurred, production would have depended on rainfall well into October. The only rain station data available shows that it rained in Nyala (Southern Darfur) for 11 days in September for a total of 93 mm, well above average for the period. If evenly spread, this would have helped to ameliorate early season crop stress and ensure yields from alternate cash crops. During October (through the 13th), rain fell on two days for a total of 13 mm. This amount could have been irrelevant to crop production. For alternate crops also, such as groundnuts and sesame, farmers would have gambled on a delayed end to the rainy season. More detailed reports on the timing of rainfall are necessary to assess its impact on rainfed production in Nyala District and elsewhere in South Darfur.

Nutrition

Details of the fourth round of the Sudan Emergency Recovery Information and Surveillance System (SERISS) survey of childhood nutrition (May to July 1987) help to identify areas requiring current intervention, as well as those areas that will be most at-risk to a food emergency next year due to a poor harvest this year (see Map 2). In general, areas of poor nutrition correspond to those identified in the previous three rounds of the survey.

In North Darfur, villages with very high levels of childhood malnutrition (over 15% of children scoring worse than -2 SD below the expected mean score)* were found in 5 of 9 surveyed rural councils (see Map 3). Two of the three villages surveyed in El Fasher District and the only village surveyed in Umm Keddada District had extremely high levels of childhood malnutrition (27.8-41.5%). El Fasher and Umm Keddada District will have a very poor harvest this year. In addition, the neighborhood surveyed in El Fasher Town had very high levels of childhood malnutrition.

In South Darfur, villages with very high levels of childhood malnutrition were found in only 2 of 15 surveyed rural councils, and these (3 villages) were all

* In the international reference population about 2.5% of the children surveyed would fall two standard deviations (-2 SD) below the mean. While 10% is often considered normal for Sudan, that level of childhood malnutrition is high, in absolute terms.

SUDAN: ESTIMATED PERCENT OF RURAL CHILDREN ACUTELY MALNOURISHED SERISS VILLAGE NUTRITIONAL SURVEY, MAY-JULY 1987

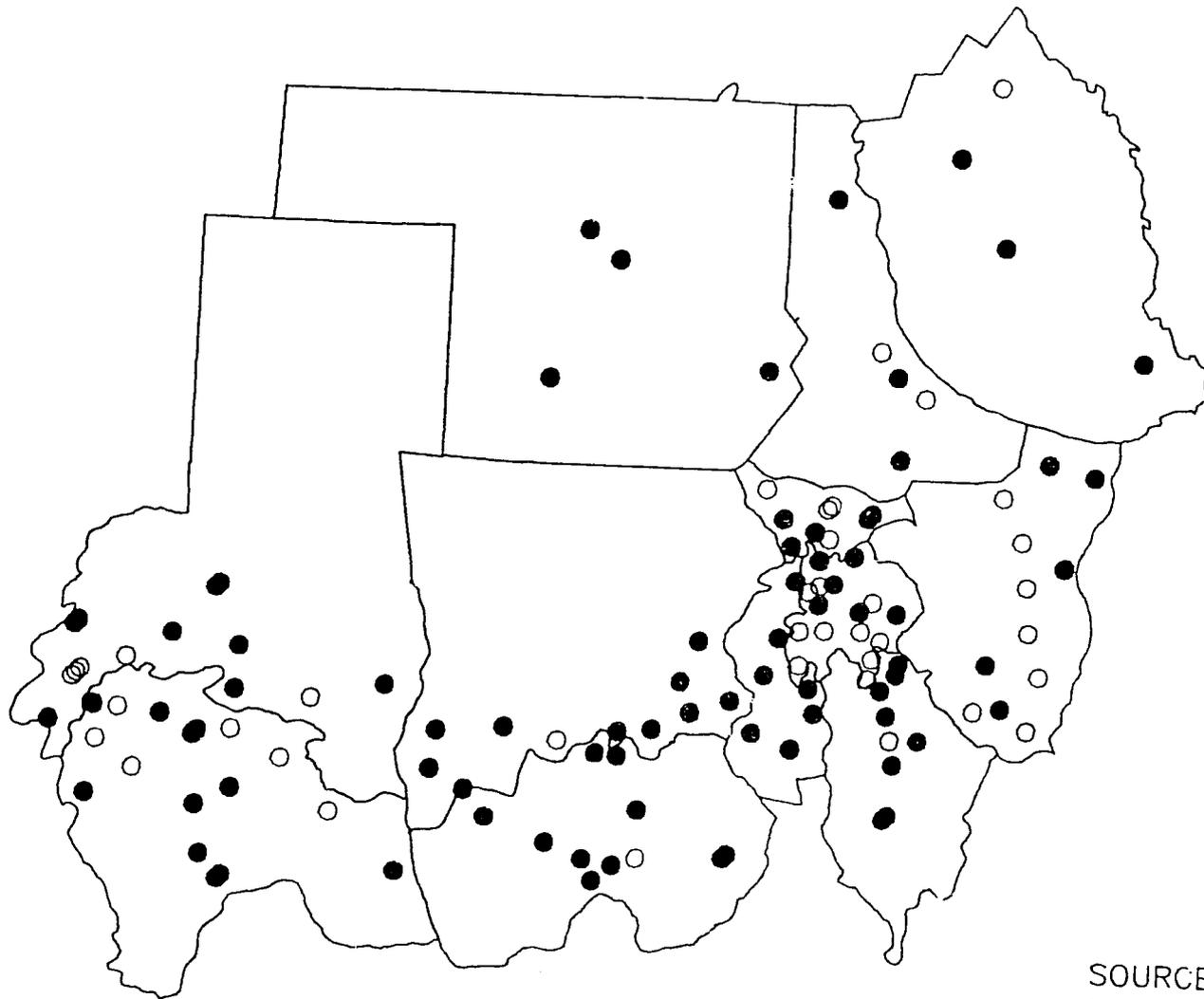
CHILDREN FALLING MORE THAN 2 STANDARD DEVIATIONS BELOW THE INTERNATIONAL REFERENCE STANDARD

MAP 2: SUDAN

ACUTELY MALNOURISHED

□ LESS THAN 10%

■ 10 TO 42%



SOURCE: MINISTRY OF HEALTH, SERISS
MAP: FEWS/PWA, OCTOBER 1987

located in Buram District, where production should be good, and should have been good last year as well.

Employment

Farmers in South Darfur use a great deal of hired labor during the course of the agricultural season. While no reports referencing employment have been received, it is likely that farm labor opportunities and relationships have been severely disrupted this year. In North Darfur the RRC reports that current economic activities are limited to firewood and grass collecting, suggesting that farm labor use in that province is non-existent.

A survey of farm labor use during the 1985 season showed that farmers in South Darfur used approximately 2 man days of hired labor per acre. While cash crops (sesame and groundnuts) demanded more labor per acre than did sorghum and millet, the latter nonetheless consumed 70% of total agricultural labor.

A sharp decline in grain production would limit the demand for agricultural labor -- which in times of drought is also a coping strategy of marginal and heavily impacted farmers. The purchasing power of agricultural laborers, in general, can be expected to decline during a period of rising commodity prices. Also expected to decline, out of proportion to the decline in grain supplies, would be the nutritional status of agricultural laborers and their families.

Alternate Foods

Famine foods, especially wild grains, are appearing on the market in Darfur Region. Excellent stands of wild grains have been reported in neighboring areas of Chad. If similar stands exist in Darfur Region, they could provide a buffer to a shortfall in cultivated crops.

KORDUFAN REGION

The situation in Kordufan Region is confusing in that ground reports, which are many, do not seem to be reflected by satellite imagery. Indeed, vegetative conditions in South Kordufan appear good to excellent and in North Kordufan about average for the period 1981-86. While average conditions in North Kordufan are not good, some yield would be expected. Ground assessments, however, indicate that yields in South Kordufan will be low (presumably because of the lack of agricultural inputs, e.g., chemicals, fertilizer and fuel) and that little harvest is expected in North Kordufan. Essentially no rain fell in El Obeid (North Kordufan) during September, while 88 mm fell in Kadugli (South Kordufan). Little or no rainfall in late September and October will severely limit the success of alternate crops (sesame,

groundnuts, watermelon) planted in late August and early September throughout the Region.

Pasturage is reported poor in the northern reaches of North Kordufan Province, which is congruent with reported changes in patterns of herd movements earlier in the season. Nonetheless, livestock prices remain high and the USAID Mission agrees that this might be due to the decreased number of animals in the area from the 1983-84 drought. If this is true, previous Government of Sudan reports, of herd recovery to pre-drought levels, must be discounted.

Regardless of the success of cash crops (groundnuts, sesame and watermelon), grain production will be reduced from 1985 and 1986 levels throughout Kordufan Region. Grain prices will rise due to local and national shortfalls in cereal production. Local people, with or without cash crops, will see their grain purchasing power reduced.

Nutrition

The fourth round of the SERISS survey showed increasing childhood malnutrition in Kordufan Region. In North Kordufan Province, three villages out of eleven surveyed showed very high levels of childhood malnutrition, but none of them approached the extreme levels found in Darfur Region. In South Kordufan Province, eight of eleven villages (in eleven rural councils) showed very high levels of childhood malnutrition--two of those rising above 20%. (See Darfur Region Nutrition section above.) While childhood malnutrition in South Kordufan Province is widespread, it also does not reach the extremes seen in Darfur Region.

Employment

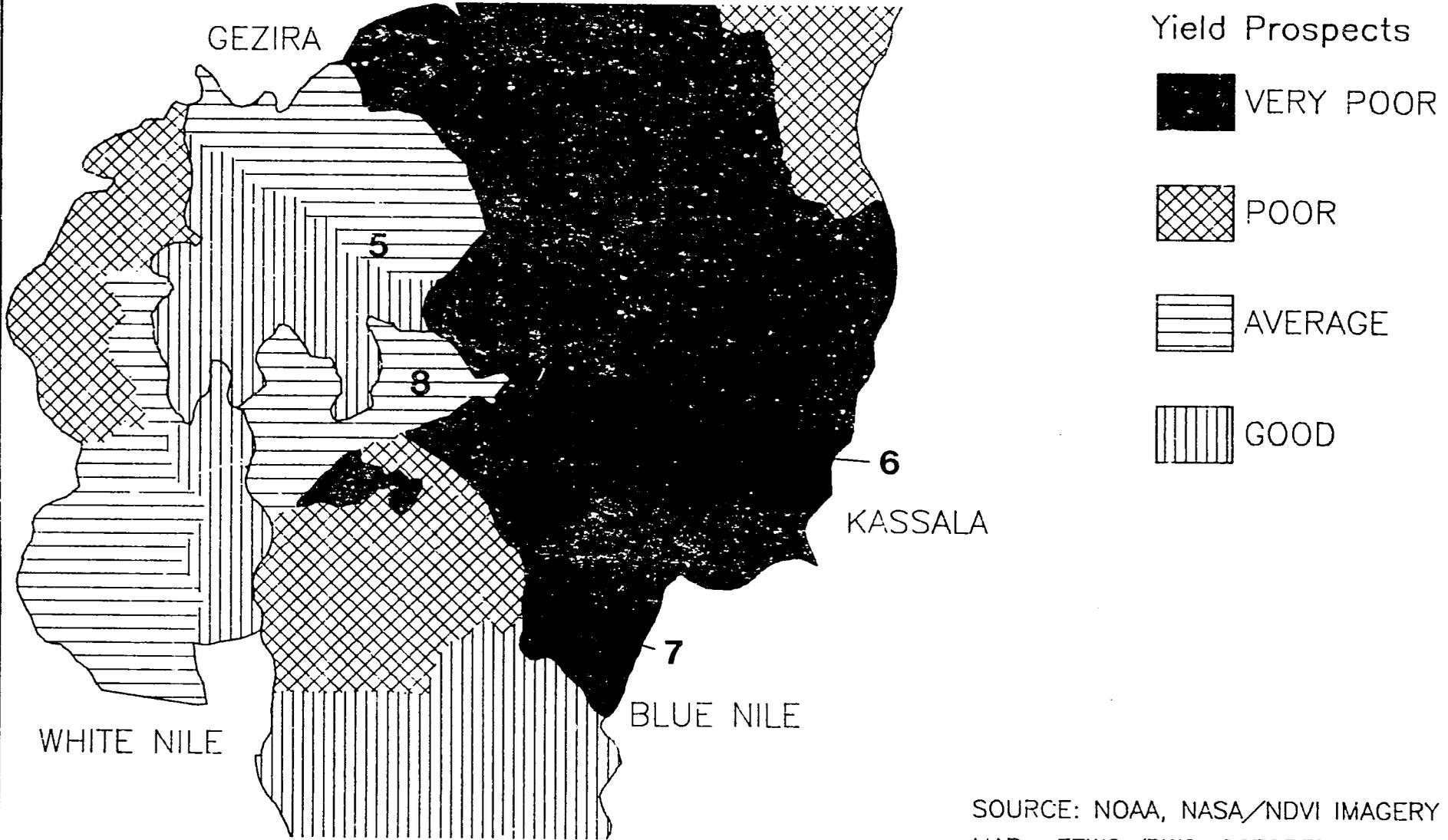
Parallel to the situation in South Darfur Province, shortfalls in production could severely impact the farm labor force in Kordufan Region. No reports have been received on this topic, however, except that significant migration is occurring out of North Kordufan Province.

NATIONAL FOOD SUPPLY

Continued rapid declines in vegetative vigor in important grain-producing areas of eastern Sudan (see Map 3, Figures 5-8), coupled with rapid price increases in the same area, reports of acreage and yield decreases from last year, and stressed crops, suggests a significant decline in total national production this year.

Of special concern is the Gedaref area of Kassala Province, which normally produces 30% of total national sorghum production. This year's production could be down 50% from that of 1986. Prices there have increased

SUDAN: Central Region and Kassala Province agricultural prospects. Inferred from satellite imagery of vegetative vigor and growth curves.



SOURCE: NOAA, NASA/NDVI IMAGERY
MAP: FEWS/PWS, OCTOBER 1987

Changes In Normalized Vegetation Indices 1987 Compared To The Historical Average, Maximum & Minimum

Map 3 locates the area represented by each figure

Figure 5

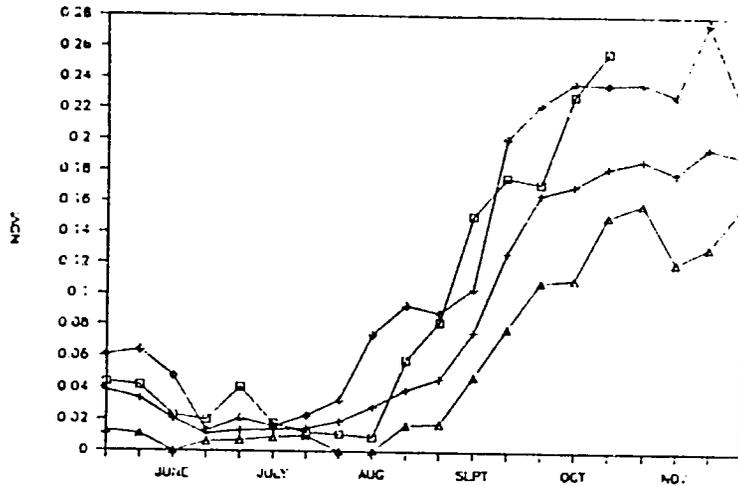
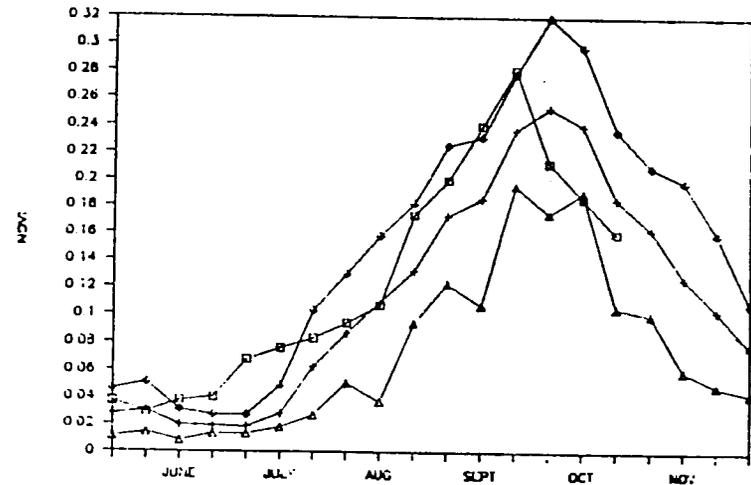


Figure 6



Legend

- 1987
- + AVG.
- ◇ MAX
- △ MIN

Figure 7

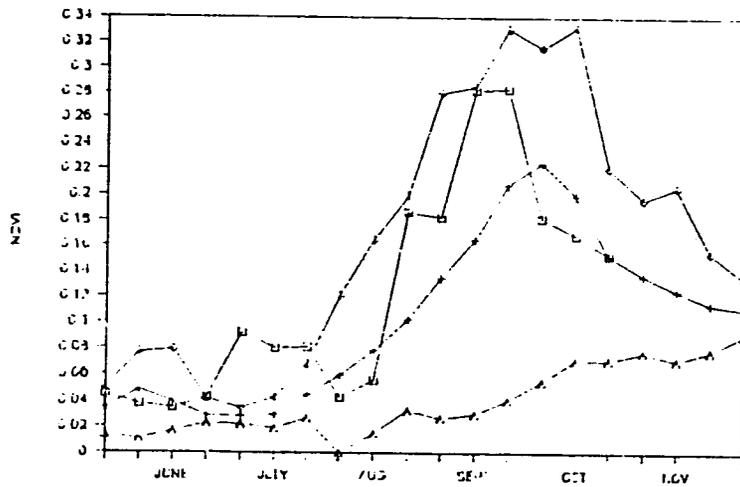
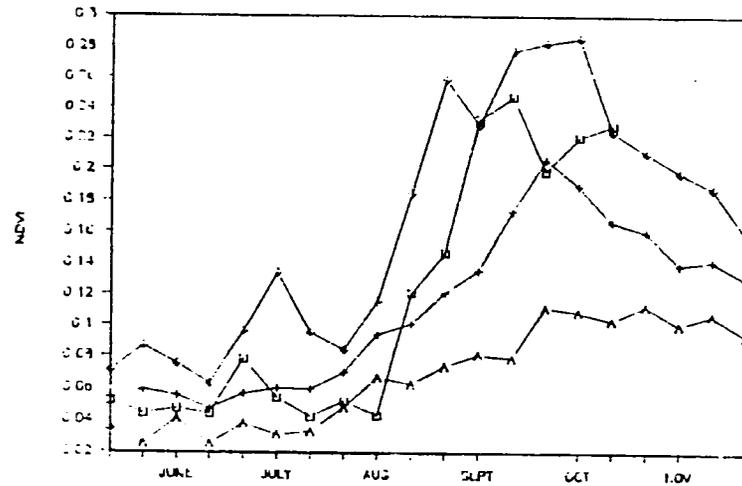


Figure 8



rapidly. The USAID Mission in Khartoum suggests this is due to increasing exports or to private traders withholding stocks in anticipation of still higher prices. An alternative explanation could be that prices are rising in anticipation of a poor harvest.

A WFP report of stressed crops, combined with satellite imagery of vegetation, NOAA's suggestion that rainfall has been unlikely in the area since September 12 (and probably low during the first 12 days of September), and the Mechanized Farming Corporation's anticipation of reduced yields and acreage this year, suggests a very significant reduction in production compared to 1986 and 1985. Rainfall data received for the Gedaref station show inadequate rainfall for September as a whole (44 mm on 5 out of thirty days, compared to average September rainfall of 100 mm). In only 9 of the previous 84 years was September rainfall worse at Gedaref station. Although rainfall totalling 65 mm fell on 4 of the first 13 days of October, there is no reason to believe this rainfall would make up for the severe dryness of September.

As a result of early season dryness in the west and late season dryness in the east, national grain production is at risk. As of the 13th of October, when the rainy season was essentially over, seven rain stations (the only ones reporting) reported below average annual precipitation.

TABLE 1: Rainfall Station Totals Through Oct. 13, 1987

| STATION | 1987 Rainfall | Historical Average |
|------------|---------------|--------------------|
| Kassala | 185 mm | 306 mm |
| Gedaref | 431 mm | 626 mm |
| Wad Medani | 241 mm | 357 mm |
| Kosti | 323 mm | 384 mm |
| Kadugli | 514 mm | 724 mm |
| Nyala | 272 mm | 464 mm |

SOURCE: RRC, Sudan

The Sudanese government is reported to believe that this year's production will not meet demand and that the stored grain remaining from both the 1985 and 1986 agricultural seasons must be reserved solely for domestic consumption until the next harvest. An export ban on grain was announced, effective the end of September 1987. The USAID Mission is concerned that this ban will not be effective.

Estimates of cereal stocks in Sudan have just been drastically reduced. The Agricultural Bank of Sudan

(ABS) estimates its current holdings at 800,000 metric tons (100,000 of which is leftover from 1985 production), with outstanding export commitments of 150,000 metric tons (MT). Combined with an estimated 450,000 MT held by private merchants, this leaves only 1.1 million MT available for domestic concerns. The ABS states that all of its grain is in good condition. There is, however, concern in Sudan that a significant portion is unfit for human consumption. The USAID Mission has passed on reports of spoiled ABS sorghum in Sennar (30,000 MT), Mesmoum (180,000 MT in very poor condition) and Kosti (so far only 25% of sacks examined are fit for human consumption, implying a total of 34,000 MT unfit for human consumption).

It would be easy to imagine a scenario in which current stocks, fit for human consumption, and current production (due to poor production in Kassala, northern Blue Nile, and Kordufan and Darfur Regions) do not combine to meet Sudanese cereal requirements during 1988. Current efforts to estimate production and survey the condition of food stocks will refine the picture of food availability in Sudan. Efforts are under way to estimate production from ground surveys (supported by aerial reconnaissance) in western Sudan, and the SERISS agricultural project's regular survey activities will result in early estimates of national production during November. Regardless of any national shortfall, it is clear that meeting emergency needs in the western provinces, with in-country resources, is increasingly problematical.

SOUTHERN REGION

Insecurity in the Southern Region continues to cloud an adequate view of the situation in rural areas. In the cities, populations of displaced people, shortages of basic commodities, and high prices (grain prices being ten times higher, in some places, than in Gezira, Blue Nile and White Nile Provinces), combine to flag urban areas in the south as at-risk both currently and in the foreseeable future.

While 70,000 MT of emergency food aid was allocated for distribution over the last six months in the Southern Region, only 20,000 MT was actually distributed. If agricultural production is as poor as reports indicate (and this is not supported by views of vegetation and rainfall obtained by satellite), and if insecurity continues to displace people, disrupt farming and herding, and limit the transport of local commodities, then even more food aid will be required. If the

experience of the last six months holds as a model for the future, it is unlikely that newly allocated food aid could be delivered in the quantities required.