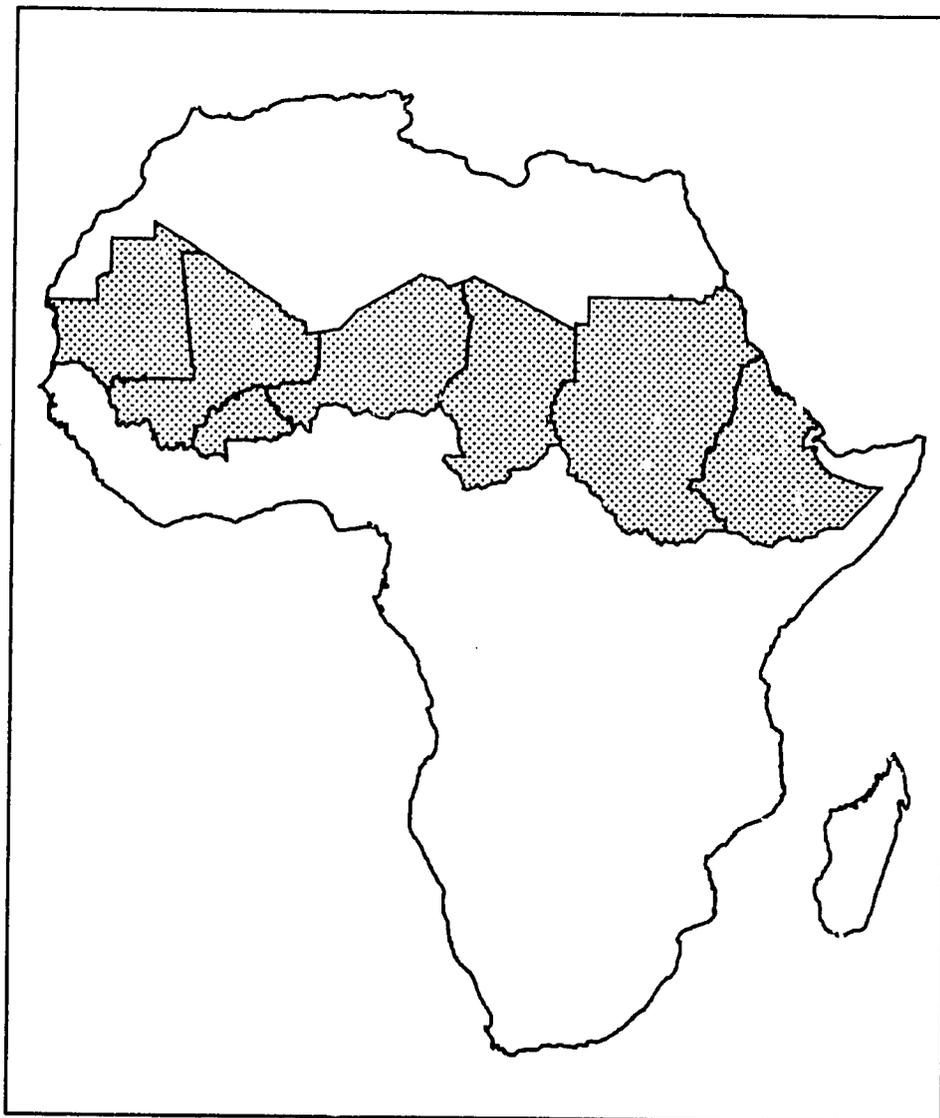


Pre-Harvest Assessment of Cereal Production



Contains reports on:

Mauritania

Mali

Burkina

Niger

Chad

Sudan

Ethiopia

Pre-Harvest Assessment of Cereal Production

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Executive Summary of Reports

The potential nationwide food crisis in Sudan and the continuing food shortages in northern and eastern Ethiopia will put more than twelve million people "at-risk" of famine. Locally severe problems in other FEWS-monitored countries involving more than a million people will also require targeted responses. These immediate and future crises will severely test national and international resources, and will. The general decline in regional food security due to the poor 1990 agricultural season suggests that next year's agricultural season will be critical and that the margin for coping with another mediocre or failed harvest is extremely thin.

MAURITANIA: PEST AND WATER STRESS THREATEN RAINFED AGRICULTURE

The rainfed crop is experiencing water stress, and facing possibly severe pest infestation thus reducing yield and placing increased importance on the outcome of the irrigated and recessional crops that have or will be planted this season. Food stress remains severe for up to 20,000 shantytown dwellers moved just outside of Nouakchott and a large percentage of villagers throughout the Senegal River Valley.

MALI: AT-RISK POPULATIONS REMAIN VULNERABLE DUE TO UNCERTAIN HARVEST

The failure of August rains combined with grasshopper infestations make the 1990 harvest uncertain. Already vulnerable populations in the Sahelian zone will be the most adversely affected. Signs of food stress are being noted in Mopti Region. Food distributions may be necessary as early as March.

BURKINA: AUGUST DROUGHT THREATENS CROP YEAR

Drought conditions in August will result in below average cereal production. A cereal production deficit of an estimated 122,000 metric tons (7 % of the 1,727,000 mt consumption requirement) can be covered by on-farm stocks and commercial imports. A Government of Burkina food aid program will be necessary for north-western Burkina and parts of the Central Plateau.

NIGER: POOR HARVEST MAY MEAN LOCAL FOOD SHORTAGES BY EARLY 1991

Niger may face increasing food insecurity in 1991 due to a potentially poor 1990/91 harvest and low levels of carry-over resources from previous years. An estimated 1.1 million people may require 141,000 metric tons of food assistance from internal and/or external sources.

CHAD: DROUGHT CONDITIONS PREVAIL IN NORTHERN SAHEL

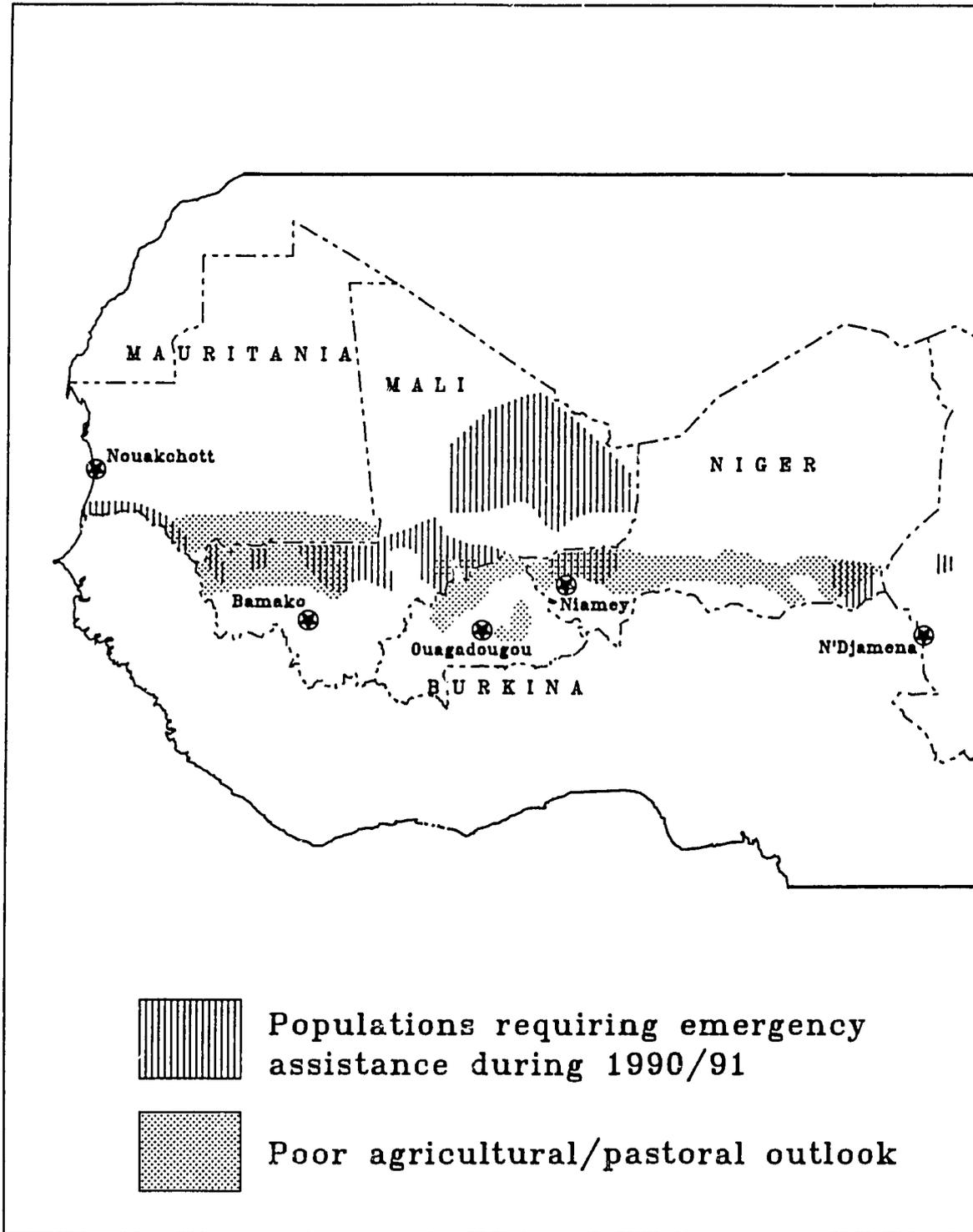
Below-average rainfall throughout Chad will result in crop failure north of the 13th parallel and will likely cause reduced yields elsewhere. For several localities in the Kanem, Biltine and Guéra regions, this will be the second consecutive year of crop failure and will place an increased number of persons in a critically-vulnerable situation. Existing in-country food security reserves will be drawn down to meet most urgent feeding requirements.

SUDAN: FOOD INSECURITY POTENTIALLY WORSE THAN IN 1984 FAMINE

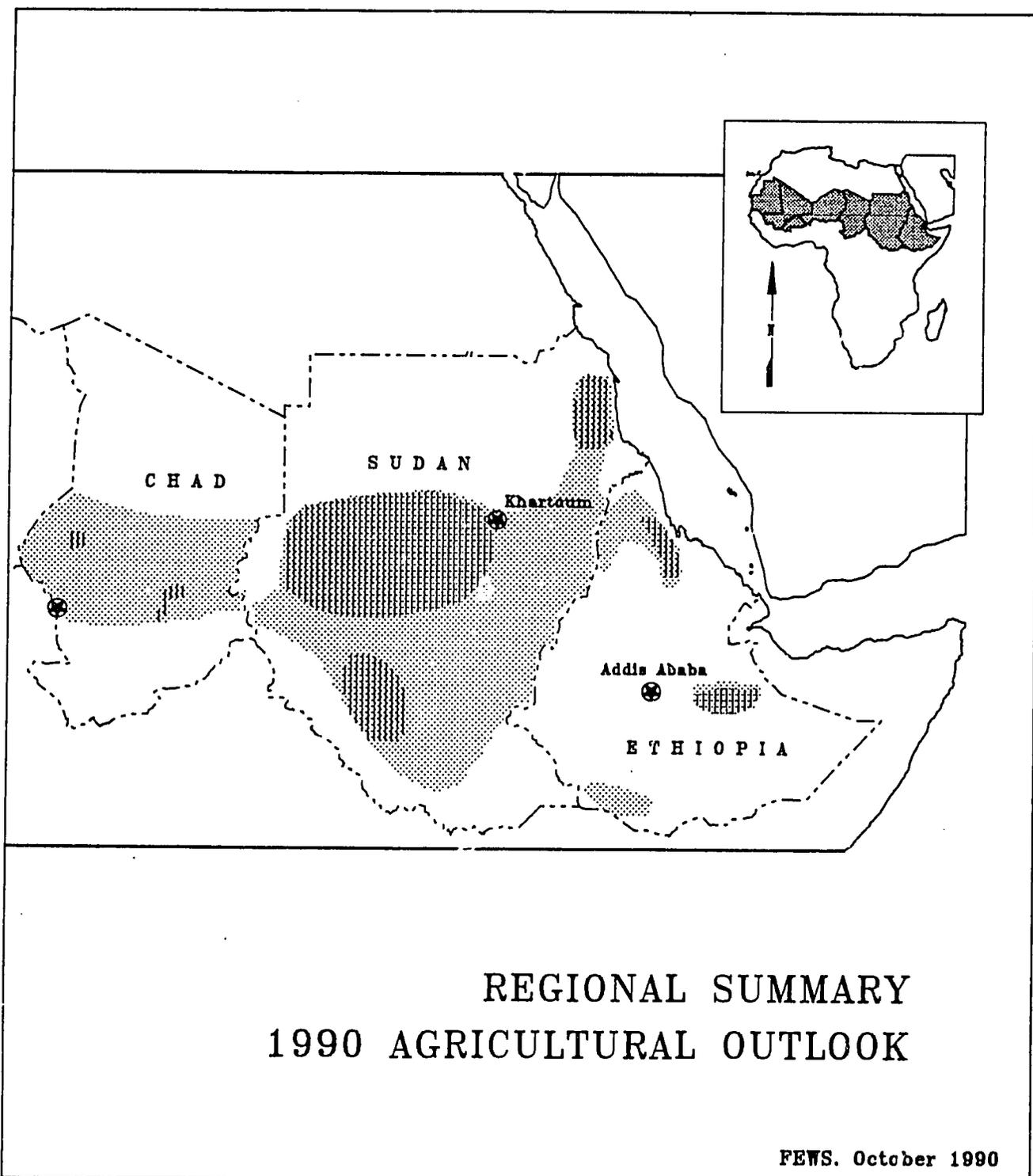
Conditions in Sudan are now similar to, and may be worse than those preceding the disastrous famine of 1984. Agricultural production is expected to be very poor. Already large and increasing numbers of displaced persons, refugees and drought victims require at least 300,000 mt of emergency assistance. Almost depleted government, private and donor stocks will necessitate massive food imports.

ETHIOPIA: NORTH AND EAST AGAIN PROBLEMATIC

For a second year in a row, the most marginal agricultural areas in Ethiopia have suffered a very poor main agricultural season due to drought and disruption. Emergency food needs for more than 3 million people will be at least 615,000 mt for 1990/91.



Map 1: 1990 Agricultural Outlook



FEWS REGION

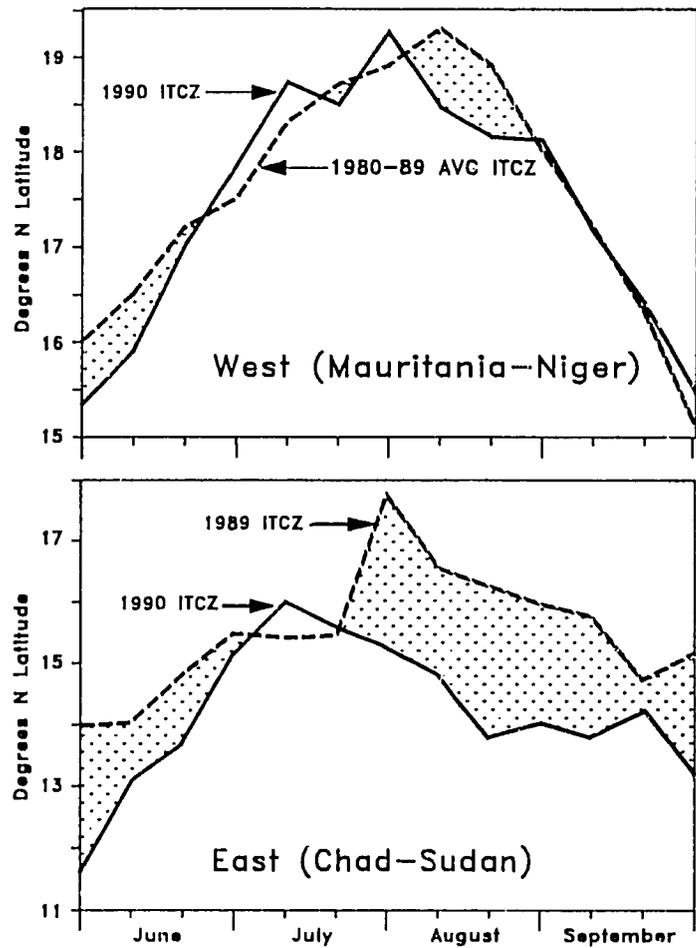
Sudan: A Crucible of Wills and Resources

There is imminent danger of a nationwide food crisis that could affect more than nine million people in Sudan. If not addressed quickly in the coming months, a famine of the dimensions seen in 1984/85 is possible. Between four and five million displaced persons and refugees are already entirely dependent upon relief assistance. Another four to five million people will be just as severely affected by this year's drought and crop failures. Almost everyone in Sudan is already significantly affected by the rocketing food prices. The immediate food crisis found in the South, West and North presents many of the classic signals of the beginnings of a famine process. As in most famines, the year's poor rainfall is not the sole cause of the problem. Last year's meagre harvest in the western traditional farming areas of Kordofan and Darfur left many farmers with few or no food reserves coming into the season. Drought in the mechanized farms of the East took away paid labor opportunities that many use to cope with crop failure elsewhere. Expanding conflict, a lack of knowledge about, and/or an official unwillingness within Sudan to accept that there is a problem, obstructed relief operations, and a slow deterioration of the nation's infrastructure and economy are all playing significant roles in forcing thousands of people to immediately move from their homes in search of food. The magnitude of the potential needs, and the economic, social and political problems that will have to be surmounted in order to deal with this emerging disaster threaten to overwhelm available resources, capabilities, and energies in Sudan and in the rest of the world. This will be a severe test of the Sudanese will to overcome a second national food crisis in 6 years. It is also a crisis that contains within it almost every one of the most difficult issues of international, and national, relief and development.

Characterizing the 1990 Main Rainy Season

The 1990 main rainy season in the FEWS-monitored countries has proved to be very similar to that of 1987 in several respects. Cumulative rainfall totals have been comparable to those of 1987 in most of the Sahel and the Horn, excepting Sudan. Geographically there are similarities as well. As in 1987, it is the marginal northern agricultural areas that have most suffered from erratic and below-average rainfall, while more southerly areas have been much less affected. One significant difference between the seasons is that 1987's poor rains followed the relatively good

Figure 1: 1990 ITCZ Movement Reflected Timing of Poor Rains



SOURCE: Joint Agricultural Weather Facility

season of 1986. This year's problematic rainfall in most areas comes after the mediocre-to-poor 1989 rains in the more northerly zones of each country. The consequences of two poor crop years in a row on food security in the fragile Sahelian and Horn environments will be relatively worse because of this.

As is seen in more detail below and in the chapters that follow, rains generally got off to a late start in the western Sahel, in Sudan and in the Horn. In the center of the continent they began normally, and even promisingly. June rainfall was generally average to good except in Sudan and the Horn where it was erratic. July was better in most

places. August is usually the month in which rainfall is the heaviest, but from Mali through Sudan rains were light or non-existent. Promising crops were burned by abnormally high temperatures unalleviated by cooling rains. Temperatures averaged more than 6 degrees centigrade higher than normal in Sudan over most of August. August's rainfall in much of Sudan was the least ever recorded. The return in September and October of relatively normal rains therefore was welcome but too late in many areas.

Tracking the Season through ITCZ Movement

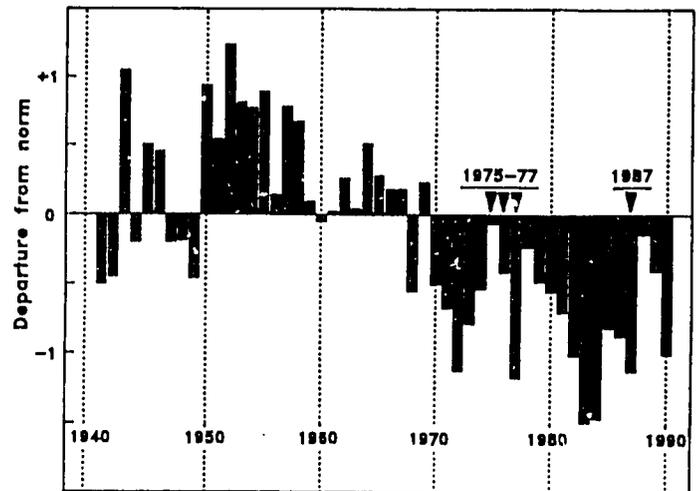
Plotting the north and south movements of the ITCZ (see Key Terms) through the season helps to confirm some characteristics of the rainy season that are difficult to see in the reporting from the Region's sparse network of rain stations. Figure 1 illustrates the movement of the ITCZ from June through 10 October in the west half of the continent and in the east. In both cases, the location of the ITCZ has been plotted and compared with a reference period (the historic record for the East is only one year long). The shaded areas in each part of the figure indicate when the ITCZ was located further south than during the reference period, and thus when rains were probably not reaching as far north. In the West, they indicate a poor start (very pronounced in Senegal) and a premature retreat in August, both of which are reaffirmed in rain station reports from the area.

For Chad and Sudan (data are not available for Ethiopia), the shaded areas show that 1990 ITCZ positions were consistently as much as two degrees south of those for comparable 1989 dates. Remember that both 1989 and the last ten years were both only average to below-average periods of rainfall in the Sahelian zones of these two countries. The ITCZ did not advance as far north and it started to retreat early, resulting in a very poor rains (see Chad and Sudan country reports). A slight pause in the retreat of the ITCZ in September probably saved the rainy season from being even more of a disaster in these countries.

Return to a Wetter Period?

After two consecutive years (1988 and 1989) in which cumulative rains in much of Sahelian Africa and in the Horn approached, but did not surpass the wetter average of the 40's, 50's and 60's, some observers were convinced of the imminent return of better rains in Africa. FEWS Bulletin #1 for 1990 and the FEWS 1990 Vulnerability Assessment of June 1990 both addressed this issue using a well-known index for Sahelian rainfall, derived by P. Lamb of the Illinois Water Survey. The index does indeed show an apparent lessening of the dry period in 1988 and 1989, but also shows

Figure 2: Sahelian Rainfall Index Shows Return to Dryness



SOURCES: P. Lamb; Climate Analysis Center; FEWS

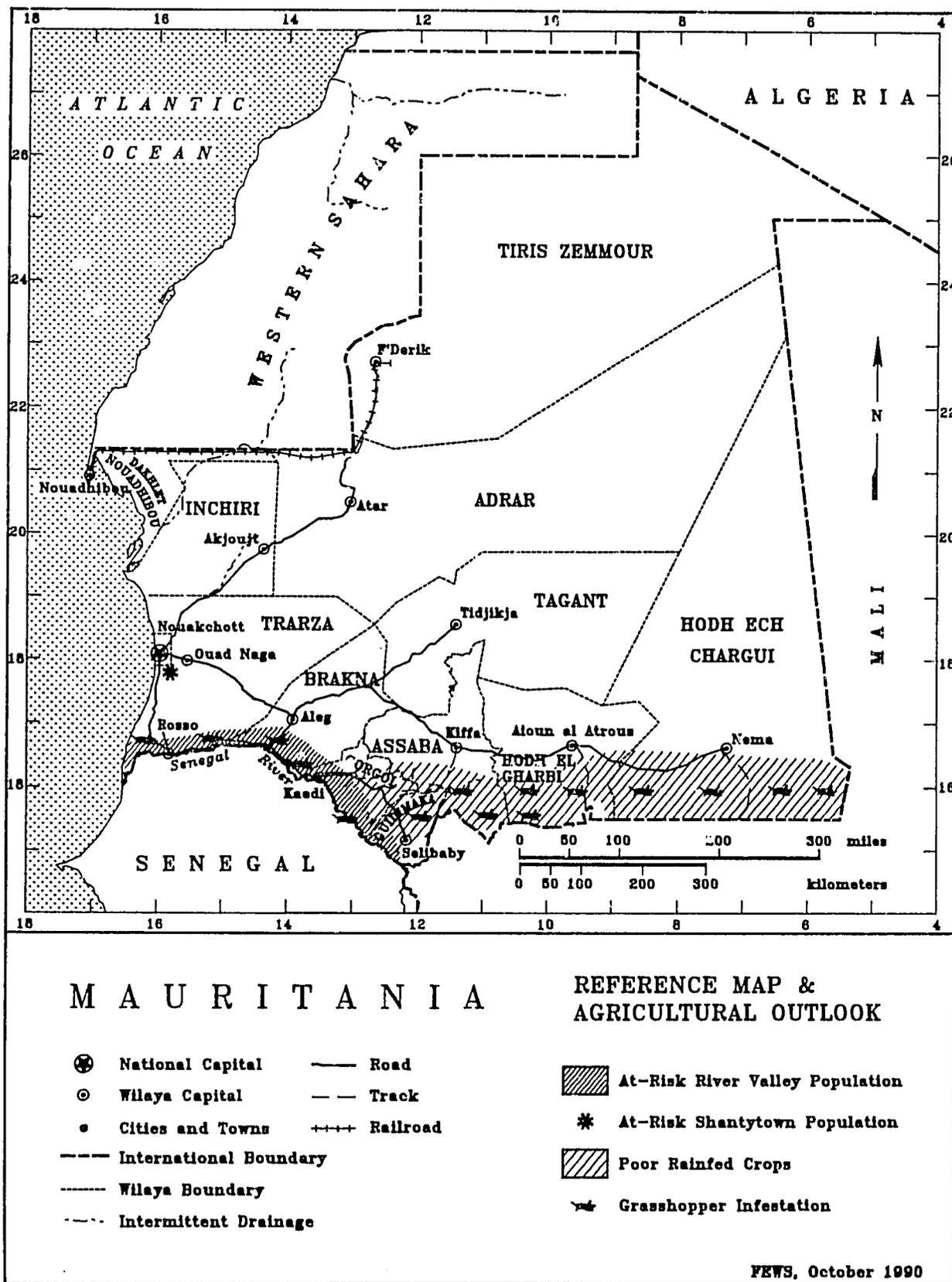
a similar pattern in 1975 and 1976 that was immediately followed by more dry years. The volatility of the yearly fluctuations argues for restraint in the interpretation of a return to a wetter period.

FEWS has recently updated the Lamb Index with 1990 data (see Figure 2). The initial estimate for the 1990 index value is -1.0, a value that approximates that of 1987. One should note that the area covered by the index runs from the Atlantic Ocean through Niger, and therefore does not reflect the very poor season experienced in Sudan, nor the slightly worse-than-average ones in Chad and Ethiopia. Conclusion? The wetter, while still below-average, years of 1988 and 1989 have not, as yet, heralded any return to wetter conditions.

Seasonal Rainfall Forecast

At the beginning of the 1990 rainy season, the UK Meteorological Office issued a seasonal forecast, reported in FEWS Bulletins #1 and 4. The experimental forecast for the Sahel as a whole (Senegal to Sudan), was for cumulative rainfall amounts between the "dry" and "average" levels, or around 87% of the 1951-80 normal. It also forecast drier conditions in the east relative to the west.

As is now seen, the east was indeed drier than the west, but initial estimates put the seasonal value at around 70% of normal, in the "very dry" category. The forecast was therefore in the correct direction and had a good spatial component but did not predict the severity of the rainfall deficits. This is nonetheless encouraging progress towards what may eventually be a useful early warning tool if more spatially refined forecasts can be made possible.



Map 2: Mauritania Reference Map

MAURITANIA

Pest & Water Stress Threaten Rainfed Agriculture

USAID and FEWS/Mauritania Report Received in Washington September 13, 1990

Summary

Severe food stress continues in the Senegal River Valley and the shantytowns around Nouakchott (see Map 2). Free food distributions are now underway in these areas. Current and soon-to-arrive food aid should help relieve some of the most severe conditions faced by the identified "at-risk" (see Key Terms) groups. These groups, however, remain extremely vulnerable to famine and there is not much hope that the 1990/91 rainfed crop will relieve food stress conditions in 1991.

Rains continued throughout the southern third of Mauritania in early September. However, rainfall remains less than last year's cumulative rainfall for the majority of stations and less than the twenty year average for a few others. Crops are experiencing water stress and menacing grasshopper infestations in Hodh el Gharbi, Hodh ech Chargui, Assaba and Guidimaka wilayas (see Map 2). Given the multiple planting regimes in Mauritania, it is too early to accurately determine total food production for this season. However, the current environmental conditions will negatively impact on rainfed, irrigated, recessional and lowland agriculture throughout Mauritania in 1990/91.

Factors Affecting Food Availability

Agricultural Conditions

Domestic production in Mauritania depends upon planting schemes that include rainfed, irrigated, recessional and lowland agriculture. All four schemes have been adversely affected by a late and weak start of the 1990 rainy season. Almost all rainfed agricultural areas (with some exceptions in the Hodh wilayas) are registering lower cumulative rainfall than 1989 and many are also lower than the 20-year average. In addition to water stress, alarming grasshopper densities have been reported throughout the eastern wilayas, including Guidimaka Wilaya. Under these conditions the rainfed crop will almost surely be less than 1989/90, although neither official evaluations nor production estimates have yet been released.

Irrigated crop cultivation began in August and continued into the beginning of September. At this writing it is too early to confidently predict the irrigated harvest outcome. The Government of the Islamic Republic of Mauritania (GIRM) emphasizes irrigated agricultural production and continues to offer favorable medium and long-term credit to this sector. The Ministry of Rural Development has proclaimed that there will be three separate irrigated crop cycles this year, in order to maximize production potential. However, other reports confirm that many small irrigated perimeters in the Gorgol and Brakna wilayas lie abandoned.

Recessional agriculture has been delayed by low river levels. Flooding has not begun and farmers are worried about the hectareage that will be inundated this year. It is still too early to determine how many hectares will be planted to recessional agriculture.

Agricultural production in lowland areas occurs in moist, sometimes dammed areas (*bas-fonds*). No official estimates of area, yield or production for lowland agriculture have been made at this time. With the increased probability of reduced rainfed crop production this year (see above), farmers are expected to increase cultivation in *bas-fonds* areas. If rains were to cease soon and pastures dry up, the *bas-fonds* crop would be subject to severe pest impact as grasshoppers shift to these areas.

Pastoral Conditions

Although 1990 rainfall has generally been poorer than in 1989, the rains over the last several years have resulted in a reconstitution of pastoral lands and fewer brush fires. Biomass development is reported to be good. Greening of pasturelands as measured by NDVI (see Key Terms) is not as good or far reaching as in 1989, but remains almost uniformly better than historical averages. The Mauritanian livestock service reports an impressive build-up in numbers and herd revitalization since the ravaging effects of the mid-eighties drought.

The locust situation in Mauritania remains calm, but grasshopper densities are alarming in all agricultural areas. Tens of thousands of hectares are reported to be infested, with grasshopper densities as high as one hundred per square

Table 1: Preliminary Food Needs Assessments Using Two Different Hypotheses (in mt)

SCENARIO A: Bureau of Agricultural Statistics' final production estimates for 1989/90 (141,621mt), 21% increase in surface area planted, no other yield changes						
Wilaya	Population 1991	Cereal Needs	Total Production	Surplus/Deficit Produced	Stock	Surplus/Deficit
Hodh ech Chargui	203,204	33,529	27,526	-6,003	1,333	-4,670
Hodh el Gharbi	157,748	26,028	17,421	-8,607	429	-8,178
Assaba	171,986	28,378	2,615	-25,763	576	-25,187
Gorgol	185,679	30,637	34,262	3,625	928	4,553
Brakna	203,377	33,558	35,317	1,759	115	1,874
Trarza	253,657	41,853	39,606	-2,247	765	-1,482
Guidimaka	121,280	20,011	8,641	-11,370	14	-11,356
AGRICULTURAL WILAYAS	1,296,931	213,994	165,388	-48,606	4,160	-44,446
OTHER WILAYAS	684,326	112,914	0	-112,914	14,977	-97,937
TOTAL	1,981,257	326,907	165,388	-161,220	19,137	-142,383
SCENARIO B: FEWS/Mauritania's final production estimates for 1989/90 (105,398 mt), NO increase in surface area planted						
Wilaya	Population 1991	Cereal Needs	Total Production	Surplus/Deficit Produced	Stock	Surplus/Deficit
Hodh ech Chargui	203,204	33,529	17,818	-15,711	1,333	-14,378
Hodh el Gharbi	157,748	26,028	17,518	-8,510	429	-8,081
Assaba	171,986	28,378	2,929	-25,449	576	-24,873
Gorgol	185,679	30,637	12,978	-17,659	928	-16,731
Brakna	203,377	33,558	25,786	-7,772	115	-657
Trarza	253,657	41,853	20,393	-21,460	765	-20,695
Guidimaka	121,280	20,011	7,976	-12,035	14	-12,021
AGRICULTURAL WILAYAS	1,296,931	213,994	105,398	-108,596	4,160	-104,436
OTHER WILAYAS	684,326	112,914	0	-112,914	14,977	-9,7937
TOTAL	1,981,257	326,907	105,398	-221,510	19,137	-202,373

SOURCES: Bureau of Agricultural Statistics, FFP, FEWS/Mauritania

NOTES: Deficit figures are before 1990/91 imports and food aid. Statistics for 1990/91 imports and food aid quantities are not yet available. Stock information is from USAID/FFP. Population figures are calculated from the official 1990 figures using a 2.7 % growth rate. Food needs are calculated using the official consumption figure of 165 kilograms per person per year.

meter (100/m²) in parts of Guidimaka *Wilaya*. Some aerial spraying and pesticide distribution to farmers is taking place. However, current pesticide stocks are not sufficient and possible significant crop loss will result if further donor assistance is unavailable. An observation team is presently in the field to evaluate the severity of the situation.

As of mid-September, the majority of grasshoppers were in pasturelands, but as grasslands dry these pests will move onto croplands and cause moderate to high crop damage. The extent of damage and yield loss will depend on the crop stage as pastures dry. If rainfall continues late into the season, it may be possible to harvest rainfed crops with minimal loss, but the *bas-fonds* and irrigated crops will remain in danger.

Food Stocks and Flows

The Office of the AID Representative in Mauritania (OAR/M) believes that household level food stocks are minimal at best and likely depleted in most of the country. Free food-aid distributions are currently being carried out by the Food Security Commission (CSA) of the GIRM. OAR/M has a 20,000 metric ton (mt) shipment of food-aid scheduled to arrive within the next few weeks. Of this 20,000 mt, 12,000 mt are for emergency distribution and 8,000 mt are to be auctioned to the private sector. Funds generated from the auction will be used to finance the implementation of the free distribution program.

Factors Affecting Food Access

Projected Food Consumption Needs

Official estimation of the 1990/91 food needs balance sheet for Mauritania has not been completed because it is too early to accurately predict the 1990/91 harvest. Current indicators such as low river levels, high pest densities and relative water stress signal an increased probability of significantly lower total production compared to last year. Conversely, the official newspaper of the GIRM (the *Chaab*) recently stated that the area under cultivation in 1990/91 will rise approximately 21 percent. No explanation was given for how this figure was derived. To highlight the impact of this increase, two preliminary 1990/91 food needs assessment scenarios were produced; one using the GIRM figure (21% increase) and the other a FEWS estimate assuming no increase in area under cultivation (see Table 1). Note that without the 21% increase in area under cultivation the national cereal deficit increases by over 40%, a deficit of 202,373 mt, rather than 142,383 mt.

Economic Data

Although tension along the border with Senegal has decreased slightly over the last month, food stress is considered high throughout Mauritania. Cross-border trading and river fishing are still forbidden. Cereal prices remain high almost everywhere in the interior of the country. In Nouakchott, cereal prices are also high, although they are relatively stable in comparison with the last two months. Prices for fresh vegetables have decreased, following the normal rainy season pattern.

Update on Extremely Vulnerable "At-Risk" Populations

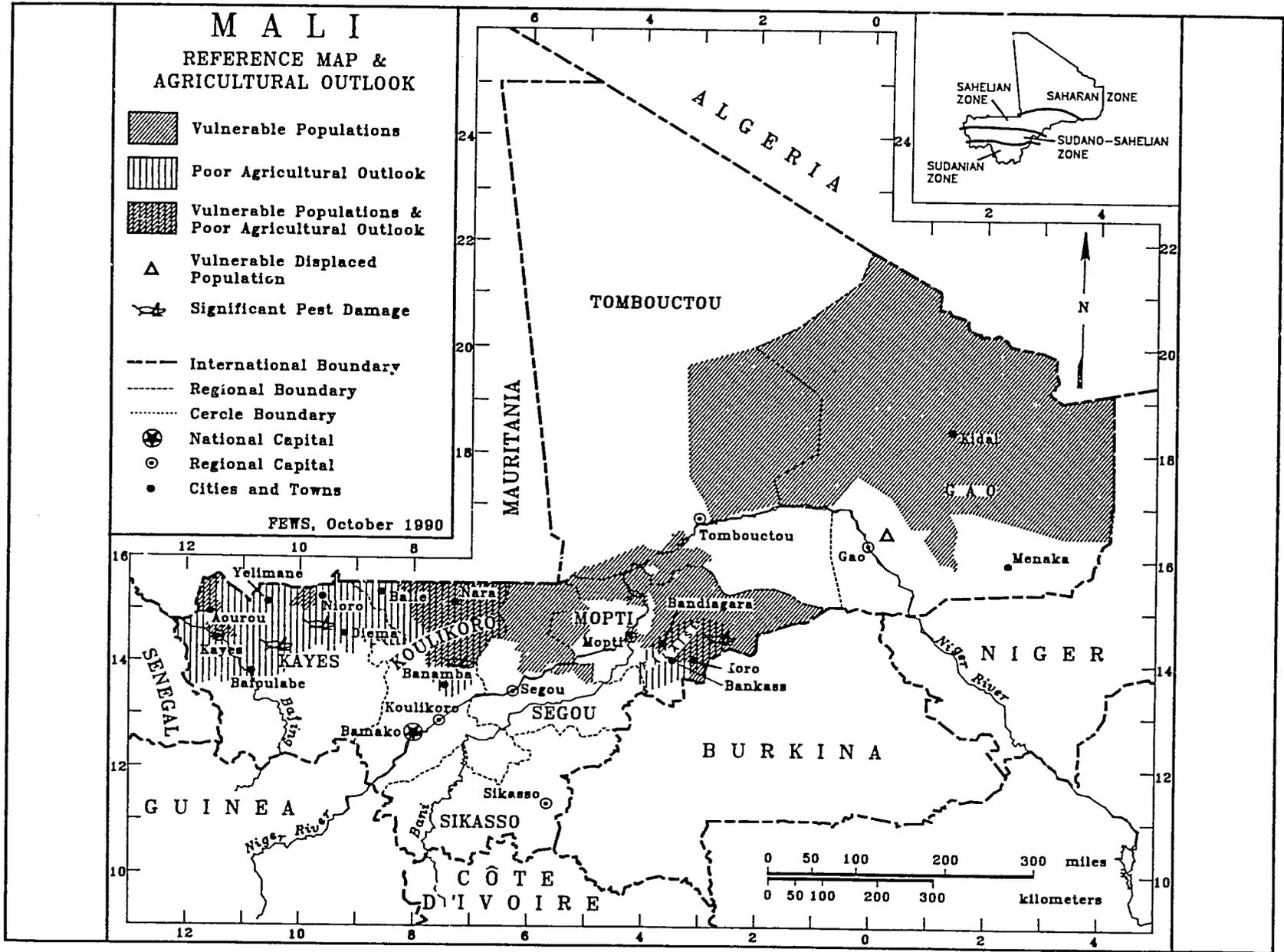
The two groups deemed extremely vulnerable in the June FEWS Vulnerability Assessment continue to be considered at-risk. Approximately 20,000 people living in shantytowns outside of Nouakchott have been forcibly moved to areas 9 to 16 kilometers south of the city along the road to Rosso (*postes kilométrages* 9 through 16). Infrastructure and support mechanisms such as adequate water supply, waste disposal, housing and electricity are still not in place. Projections of the possible increase in the number of people in these areas reach 129,000. Transportation into Nouakchott is too costly for many to seek work or continue schooling and malnutrition levels are alarming.

The second identified at-risk group are residents of the Senegal River Valley. Household food stocks this year are depleted and there are reports of high rural emigration to urban centers in search of employment. If the 1990/91 harvest is poor, the number at-risk will increase significantly. However, it is still too early to predict the outcome of this season's total production.

Conclusions

It is too early in the Mauritanian agricultural season (with regard to three of the four main cultivation practices) to determine the prospective 1991 food security situation. Official preliminary estimates or reports were not available as of mid-September. However, available information indicates that the rainfed crop will be smaller than in 1989/90. Indeed, total agricultural production could be less than the 1989/90 final official estimate of 141,621 mt, even if all other cultivated crops produce as well as last year. Emergency donor assistance was needed in 1990 and Mauritania is a chronic food deficit country (even a good harvest only covers around 40% of food needs), thus it is almost certain that emergency donor assistance will be required in 1991.

Map 3: Mali Reference Map



MALI

At-Risk Populations Remain Vulnerable Due to Uncertain Harvest

USAID and FEWS/Mali Report Received in Washington September 28, 1990

Summary

The onset of the 1990 rainy season was normal in southern and central parts of Mali, but delayed in northwestern and eastern areas. Early vegetative growth was above normal throughout the country. An August dry spell throughout the Sahelian Zone (see Map 3), compounded by major grasshopper infestations, threatens the 1990/91 harvest particularly in the areas where rains started late. Significant crop damage has been reported in the northwestern and eastern portions of the country. The 1990 Vulnerability Assessment identified major populations in these areas as vulnerable to famine and they remain so as the 1990/91 harvest begins (see Map 3). Emergency food relief may be needed for these people as early as March 1991.

Factors Affecting Food Availability

Agricultural Conditions

The onset of the 1990/91 rainy season was normal in the southern and central parts of Mali. Agriculturally significant rainfall in the north was delayed until late June or early July, particularly in Kayes and Nara *cercles*. The rainfall in July was generally very good. The first two dekads (ten-day periods) of August were dry throughout the country, particularly in Koulikoro Region. This dry period came when most cereals were reaching their flowering and panicle formation stages, raising fears of significant crop damage. Rains returned to the southern portions of the country in September. NDVI imagery (see Key Terms) indicates that overall vegetative conditions were generally better than average over the non-saharan portion of the country, though some early browning has been noted in western Nara (Bullé) and eastern Nioro *cercles*.

Grasshopper and blister beetle infestations have been significant, particularly in northern Koulikoro and Mopti regions. Hatchings were noted in early July throughout the "Sahelian Zone", the area receiving 300 to 700 millimeters

(mm) of annual precipitation. Grasshoppers were reported crossing the Mauritanian border into Yelimané and Nioro *cercles* in mid-August. By the end of August grasshoppers had infested 250,000 hectares (ha), compared to 100,000 ha at the same time in 1989. Many farmers have had to reseed several times, particularly in eastern Mopti Region.

As native vegetation dries, pest infestation of cropped fields is expected to increase, and fledglings and adults may broaden their zone of infestation, as well as reinfest previously treated fields. Village treatment brigades have created protective bands around fields and dug up grasshopper egg pods. Approximately 85,000 ha have been treated with pesticides to date. The efficacy of this treatment has been limited because of insufficient pesticide quantities.

Official estimates of area planted and expected crop yields will not be available until mid-October. Preliminary estimates may be released in late September. Opinions regarding the final outcome of the 1990/91 harvest range from average to worse than average. The final harvest outcome will depend upon the impact of insect damage and the exceptionally low August rainfall.

Evidence of localized damage to the sorghum and millet crops due to the failure of early and mid-August rains is beginning to emerge. Significant losses to the corn crop were reported in parts of western and central Mali (by Opération de Développement Intégré des Productions Arachidières et Céréalières - ODIPAC) and confirmed for central Mali (by Opération Haute Vallée - OHV). Millet, sorghum, and corn crops are reported to be severely threatened by grasshopper infestations and drought in the *cercles* of Nioro, Bafoulabé (northern portion), and Diema (by Opération de Développement Intégrée du Kaarta - ODIK). Crop losses along the escarpment (*falaise*) in Mopti Region have been severe due to poor rains, grasshopper infestations, and sand depositions. Actual crop losses due to insect damage will not be clear until October.

Official figures on area under cultivation are usually available during the agricultural season. These figures, combined with yield estimates, allow gross production estimation after

Table 1: Estimated Range for 1990 Area Planted and Cereal Produced

Agroclimatic Zone	Area Planted ('000 ha)		Cereal Produced ('000 mt)	
	'86 base	'89 base	'86 base	'89 base
West	175.8	290.1	132.3	215.3
Kaarta	150.6	217.9	70.2	113.2
Haute Vallée	63.5	109.0	70.6	114.3
South	1,306.0	891.2	726.8	750.7
Moyenne Vallée	62.5	183.5	64.7	92.8
Center	391.2	636.5	479.2	439.3
Delta	155.3	199.6	90.6	102.6
Seno	201.4	227.3	110.0	116.8
Lake	56.8	139.4	38.2	94.8
River	27.1	18.5	12.2	37.7
North	24.8	16.3	2.2	6.1
Total Estimated Range	2,498.92	2,842.4	1,797.2	2,083.6

SOURCE: Agricultural Production from the Direction Nationale de la Statistique et l'Informatique (DNSI)

NOTES: For clarity, Kaarta has been substituted for the DNSI Sahel Zone. Area planted is from the base year figure adjusted for the timeliness of the first accumulated 25 mm of rainfall (signifying the onset of the planting season). Production is from the base year figure adjusted for cumulative rainfall during the second dekad of August (signifying the effect of mid-season rains on final harvest production). Haute Vallée includes Bamako.

adjusting for stress due to drought and/or pests. As of this writing, the Government of the Republic of Mali (GRM) had not released data on area planted for 1990. The GRM is waiting until results from a yield survey are available in order to provide preliminary production estimates by late September.

In lieu of official data on area planted, a model was constructed to estimate this information with adjustments for early and mid-season cumulative rainfall. Estimated 1990/91 production is based on production differences from the benchmark years of 1986 and 1989, "normal" and "recently good" production years, respectively. Differences between 1990/91 estimated production and the benchmark years is assumed to be the result of early season rainfall on surface area planted and mid-season rainfall on yield per hectare. A range of production estimates for 1990/91 is presented in Table 1. This is a gross qualitative estimate and should not be interpreted as expected actual production.

Pastoral Conditions

Pastoral conditions have remained favorable throughout the 1990/91 agricultural season with NDVI indicating better than average range and pasture conditions. Animal health remains normal for the season and range-use patterns remain unchanged. Some overstocking may be anticipated if significant herder migrations continue from Mauritania to the Kayes Region, particularly in Aourou Arrondissement. Pastoralists may be expected to move in greater numbers towards Kayes, Yelimané, and Niore if civil unrest continues in Mauritania.

Food Stocks and Flows

National cereal security stocks totalled 33,979 metric tons (mt) as of September 9, 1990. At the same time last year these stocks totalled 54,505 mt. Commercial stocks stored at Malian food security stock management (OPAM) warehouses are similarly reduced. The previous levels of storage will not be reconstituted if the 1990/91 harvest is particularly poor, and significant drawdown of the remaining stocks can be anticipated.

The GRM cereal market information system (SIM) reports that grain is presently available in most markets. Cereals available in the market were augmented by the auction of 6,000 mt of rice in August, but this may have only a short-term effect on grain availability and price.

Factors Affecting Food Access

Projected Food Consumption Needs

Based upon estimated production from Table 1, the 1990/91 cereal balance may range from a surplus of 118,328 mt to a deficit of 110,802 mt. Annual cereal consumption in Mali is based upon USAID/Bamako estimated rates of 188 kilograms per person per year. Population is estimated from the 1987 census and adjusted for a 2.5 percent annual growth rate. The quoted cereal balance range is adjusted for consumption and losses (25% for seed, milling and other), but does not account for existing food stocks.

Opinions of GRM personnel and other agricultural experts regarding the outlook for the 1990/91 harvest tend to support this estimate of the range. It is likely that significant portions of the population, particularly those living in areas experiencing major crop loss, will require food distributions by March 1991 (even before the onset of the hungry season, *la soudure*). Emergency food import needs will be officially determined when actual production data is made available.

Food distributions may be necessary in localized areas even under the surplus 1989 scenario. This was the case in 1989/90 in which there was the second largest harvest on

record. The distribution of 6,000 mt of food aid in June and July met minimal needs in "at-risk" (see Key Terms) areas at the outset of the planting season. Suspension of Food for Work and Mother and Child Feeding programs in Ménaka and Kidal *cercles* (Gao Region), have significantly reduced food access for up to 25 percent of the local population in the participating communities.

Economic Data

Summary price data from the SIM and the Direction Nationale des Statistiques et de l'Informatique (DNSI) do not indicate any significant change from normal seasonal trends. A prolonged increase is noted which may reflect the impact of a mediocre harvest in the previous year rather than expectations regarding the 1990/91 harvest. No significant cereal price increases were noted in vulnerable areas relative to the rest of the country, although some profiteering has been reported in Bandiagara, Koro, and Bankass.

Update on Extremely Vulnerable "At-Risk" Populations

Vulnerable populations in Mali remain largely unchanged from those identified in the June 1990 Vulnerability Assessment (see Map 3). Emergency food distributions in June and July had little long-term impact. Favorable rains and pasture conditions have relieved the pressure on vulnerable and at-risk populations in Tombouctou. Repatriated populations in Gao remain "at-risk", particularly in light of recent civil unrest in the area. All areas identified as having major at-risk populations in Koulikoro and Kayes regions remain vulnerable due to crop losses from drought and insect damage.

Displaced populations in Kayes Region continue to increase and may be expected to further exacerbate the situation there.

The area of primary concern appears to be in Mopti Region along the escarpment, particularly in Bandiagara, Bankass, and Koro. Extremely heavy crop losses of 50 to 100 percent are reported again this year. USAID Mission personnel report observing extensive migration of young, able-bodied workers from this area during a period of the year when they normally remain to work the fields. Isolated incidents of severe food stress have been reported and the affected populations have resorted to collecting wild foods which are used during times of famine.

Conclusions

Given the poor outlook for crop yields in certain zones, significant populations have been placed at-risk. Localized production deficits are likely, particularly in southeastern Mopti and northern Koulikoro and Kayes regions. Emergency food distributions in these areas may be necessary as early as March 1991. The progression of this situation will be monitored through changes in cereal prices, migration from affected areas, and ultimately by nutritional stress indicators. The magnitude of localized deficits will be revealed when preliminary production estimates are produced in late September; official decisions regarding the need for emergency food aid will be made at that time. The source of food stocks for distribution to at-risk groups will depend on whether there is a national cereal production surplus or deficit.

BURKINA

August Drought Threatens Crop Year

USAID and FEWS/Burkina Report Received in Washington September 14, 1990

Summary

The 1990/91 cereal production season began unevenly. Early rains in May were followed by low rainfall in June, adequate rain in July and severe shortages in August. The drought conditions of August will reduce the national cereal harvest below the 1984-89 average. FEWS estimates a national cereal deficit for 1990/91 of approximately 122,000 metric tons (mt); 22,000 mt greater than the 100,000 mt average deficit for Burkina.

The northwestern provinces of Yatenga, Passoré and Soum (see Map 4) have been especially hard-hit by low rainfall. These provinces were categorized as "Extremely Vulnerable" (see Key Terms, "At-Risk") in the 1990 FEWS Vulnerability Assessment. For the second consecutive year these provinces have experienced a cereal deficit that will increase household poverty of smallholder agriculturists, the largest socioeconomic group in the area. Increased household poverty will exacerbate the incidence of malnutrition among women and children, unless steps are taken to supply support before January 1991.

Factors Affecting Food Availability

Agricultural Conditions

The primary source of food availability in Burkina is national production. General qualitative indicators of annual cereal production include cumulative rainfall, METEOSAT imagery and NDVI imagery (see Key Terms). Cumulative rainfall from May through August 1990 has been less than the 1951-80 average for the same period over most of the country (see Table 1). Severe shortages (less than 80 percent of the 1951-1980 average) occur at Ouahigouya, Bazéga, Fada and Boromo. METEOSAT rainfall estimates support the point data given in Table 1. These estimates suggest most of Burkina is 50 to 100 millimeters (mm) behind the thirty-year average for cumulative rainfall. NDVI values remained about average through the second dekad (ten-day period) of August over most of the country. The exceptions were Tapoa, Gourma and Kouritenga provinces which had NDVI values slightly less than the 1982-1989 average.

Table 1: Cumulative rainfall as of August 31st, 1990 compared with average (in mm)

Station	1990	1951-80 Avg.	% of Avg.
Ouahigouya	294	508	58
Fada	417	698	60
Boromo	448	694	65
Bazéga	517	651	79
Saria	532	635	84
Ouagadougou	566	659	86
Po	601	687	87
Dori	400	441	91
Dédougou	613	662	93
Kamboinsé	480	481	100
Bobo-Dioulasso	826	814	101
Gaoua	783	742	106

SOURCE: Government of Burkina (GOB) National Meteorological Service, Division of Agroclimatology (METEO).

A review of cereal crop conditions by region indicates that rains in late May allowed planting over wide areas, especially in the southwestern, southern and southeastern regions of Burkina. The dry June period retarded millet growth and caused several sorghum replantings. Since then, cereal crops in these regions have been doing well, except in Sissili and central Mouhoun provinces where rainfall shortages in August will severely reduce production.

On the Central Plateau, a dry June forced planting to begin in July and continue into the first dekad of August. Poor rainfall in the normally wet second and third dekads of August has further retarded cereal growth. Good rains in October will be necessary in this area to realize an average-size harvest.

Early rains in the northern part of the country enhanced pasture renewal but not cereal production. In Séno Province

Table 2: 1990 FEWS Cereal Production Estimate for 1990/91 (In mt)

Province	Crop Condition	Correction Factor	84-89 Avg. Cereal Production	Standard Deviation	Coef. Var.	Cereal Production Estimate
Passoré	1	-0.50	54,679	16,746	31	46,305
Yatenga	1	-0.50	69,521	27,511	40	55,766
Kouritenga	2	-0.25	27,518	4,574	17	26,375
Ganzourgou	2	-0.25	46,462	12,524	27	43,331
Sourou	2	-0.25	57,786	12,993	22	54,537
Oudalan	2	-0.25	12,395	3,876	31	11,426
Gnagna	2	-0.25	55,205	22,021	40	49,700
Soum	2	-0.25	27,307	11,261	41	24,491
Séno	3	0.75	49,712	15,528	31	61,358
Kossi	3	0.75	104,810	25,429	24	123,882
Mouhoun	3	0.75	80,034	12,650	16	89,522
Gourma	3	0.75	76,707	24,372	32	94,986
Kadiogo	3	0.75	11,206	8,977	80	17,938
Bazéga	3	0.75	65,485	18,853	29	79,625
Sanmatenga	3	0.75	81,145	13,852	17	91,534
Oubritenga	3	0.75	60,411	18,389	30	74,203
Bougouriba	3	0.75	58,563	7,983	14	64,550
Bam	3	0.75	27,594	12,371	45	36,872
Boulgou	3	0.75	95,240	17,970	19	108,717
Tapoa	3	0.75	38,213	11,059	29	46,507
Sissili	3	0.75	57,640	19,478	34	72,249
Namentenga	3	0.75	33,515	16,383	49	45,802
Zoundwéogo	3	0.75	33,428	4,054	12	36,468
Boulkiemdé	3	0.75	70,105	15,565	22	81,779
Sanguie	3	0.75	48,555	13,740	28	58,860
Poni	3	0.75	49,262	6,157	12	53,880
Nahouri	3	0.75	16,056	4,841	30	19,686
Comoé	4	1.00	79,484	4,571	6	84,055
Houet	4	1.00	145,411	36,610	25	182,022
KénéDougou	4	1.00	47,719	4,660	10	52,378
TOTAL			1,681,157			1,888,804

SOURCES: GOB sources include the Department of Planning and Studies in the Ministry of Agriculture and Livestock (MAE/DEP) especially from the "Résultats de l'Enquête Agricole Permanente: 1984-1989,"; and the Regional Centers for Agricultural Promotion (CRPA). International sources include AGRHYMET, CILSS, FAO and USAID/FEWS.

NOTES: Correction Factors used in Adjusting 1990/91 Production Estimate:

Cereal Production Rating (1990/91)	Correction Factor
Very Much Below Average	-0.50
Below Average	-0.25
Average	0.75
Above Average	1.00

the rains were well established in July and crops are now in good condition there. Moisture shortages throughout August have left crops in very poor condition in Yatenga and Oudalan provinces. Grasshoppers have caused localized, but economically significant, damage throughout the northern provinces.

Staggered cereal planting dates and regional moisture stress have resulted in differing stages of plant development over relatively short distances. Therefore, it is difficult to evaluate the effects of moisture stress at various calendar dates on a national level. However, the widespread late plantings will require good rains through the first dekad of October. October rainfall is unlikely north of Ouagadougou.

FEWS/Burkina has estimated 1990/91 cereal production by combining rainfall and NDVI data with qualitative information available from the Government of Burkina (GOB). Table 2 presents the results of this exercise by province. Total estimated cereal production for 1990 is approximately 1,890,000 mt. This is less than the 1989/90 production of 1,950,000 mt (a relatively good year) and about 200,000 mt more than the national average for 1984-89.

The provincial production estimates of Table 2 were obtained by multiplying the standard deviation of each province's production by a correction factor reflecting relative harvest prospects, and adding the resultant figure to the 1984-89 average provincial production. Correction factors were developed based on evaluations made by agents of the Regional Centers for Agricultural Promotion (CRPA) and published in the September 11, 1990 "Bulletin Rapide" from the Department of Planning and Studies in the Ministry of Agriculture and Livestock (MAE/DEP). This method yields an estimate of cereal production that reflects the variability across provinces in the evolving 1990/91 agricultural campaign. For example, average annual cereal production in Houet Province is 145,411 mt, with a standard deviation of 36,610 mt. Available qualitative information for 1990/91 suggests cereal production will be above average for this province. Thus, the standard deviation was multiplied by a factor of 1.00. The result was added to the 1984-89 average to give 182,022 mt, the FEWS cereal production estimate for 1990/91.

Pastoral Conditions

Pastures got a good start in northern and eastern Burkina. However, as noted for cereal crops, poor rainfall distribution caused severe moisture stress in eastern Burkina. NDVI values remained below the 1982-89 average through the second dekad of August, indicating reduced pasture regeneration. Poor rainfall distribution is less problematic on the Central Plateau, where cumulative rainfall has been sufficient to support pastures.

Table 3: Food Stocks for 1990/91 (In mt)

SOURCE	COMMODITY	SUB-TOTALS	TOTALS
OFNACER	Stabilization		21,291
	Security		35,375
On-Farm Stocks	Cereals		50,000
Cathwel	Cornflour	12,363	
	Wheat	2,500	
	Beans	2,411	17,274
World Food Program	Cereal		5,750
Commercial Imports	Wheat		35,000
	Rice		100,000
TOTAL STOCKS			264,690

SOURCE: MAE/DEP, CRPA, and FEWS/Burkina

NOTE: On-farm stocks is the FEWS Estimate. Office National des Céréales (OFNACER) stocks are as of 8/23/90.

Food Stocks and Flows

On-farm stocks as of October 1989 were estimated at 200,000 mt by the MAE/DEP, following the 100,000 mt cereal surplus of the 1988/89 agricultural season. The 1989/90 season yielded a national cereal deficit of 50,000 mt. Thus, most of the 1988/89 surplus is probably exhausted. This report estimates 1990 on-farm stocks at 50,000 mt. The bulk of these stocks are assumed to be in southwestern Burkina. An initial assessment of total stocks and planned imports for 1990/91 is summarized in Table 3 above. These stocks and imports are not expected to cover the estimated national cereal shortage for 1990/91.

Factors Affecting Food Access

Projected Food Consumption Needs

Food access in Burkina has been assessed here from the estimated 1990 cereal balance for each province compared with its 1984-89 average. The cereal balance compares net cereal production (85 percent of gross) to consumption needs of the population (assumed to be 190 kilograms per person per year). National consumption needs for 1990/91 are estimated at 1,727,195 mt. Table 4 presents the FEWS estimated cereal balance for the 1990/91 agricultural campaign. The estimated cereal production deficit of 122,000 mt is 22,000 mt greater than the 100,000 mt average and 70,000 mt greater than in 1989/90.

Table 4: Estimated Cereal Balance for 1990-91 (in mt)

PROVINCE	POPULATION 6/1991	1990 EST. PRD. (NET)	85-89 AVERAGE	CEREAL BALANCE 1990 FEWS EST.	DEF. 2 YEARS
Kadiogo	639,040	15,247	-92,237	-106,170	
Yatenga	558,512	47,401	-36,741	-58,716	YES
Soum	218,241	20,818	-15,311	-20,648	YES
Kouritenga	222,492	22,418	-15,416	-19,855	
Oudalan	121,132	9,712	-10,845	-13,303	
Sourou	308,316	46,357	-2,078	-12,223	
Gnagna	267,841	42,245	7,745	-8,645	YES
Nahouri	119,458	16,733	-7,051	-5,964	
Ganzourgou	221,339	36,831	3,777	-5,223	
Passoré	234,044	39,360	2,863	-5,109	YES
Boulkiemdé	389,205	69,512	-8,006	-4,437	
Poni	255,948	45,798	-3,991	-2,832	
Zoundwéogo	172,657	30,998	-1,829	-1,807	
Bam	174,132	31,341	-5,931	-1,744	
Namentenga	212,801	38,932	-7,062	-1,500	
Bazega	350,039	67,681	-3,446	1,174	
Oubritenga	324,588	63,072	-2,605	1,401	
Sanmatenga	402,056	77,804	-1,503	1,413	
Séno	263,592	52,154	-12,090	2,072	
Tapoa	185,907	39,531	1,123	4,208	
Boulgou	459,941	92,410	4,939	5,021	
Sissili	294,061	61,411	2,480	5,540	
Sanguié	233,665	50,031	2,911	5,635	
Bougouriba	241,782	54,867	8,266	8,929	
Mouhoun	333,006	76,094	11,949	12,823	
KénéDougou	159,322	44,522	13,286	14,250	
Gourma	343,636	80,738	12,224	15,447	
Comoé	292,681	71,447	17,077	15,837	
Houet	710,625	154,718	8,876	19,700	
Kossi	380,445	105,300	28,352	33,015	
TOTAL	9,090,504	1,605,483	-100,279	-121,713	

SOURCES: Institut National de la Statistique et de la Démographie (INSD), CRPA, MAE/DEP, USAID/FEWS.

NOTES: Provincial population projections for June 1991 are based upon exponential extrapolations of the 1985 census.

Table 5: Price of millet in July at selected markets

MARKET	1990	1989	PERCENT CHANGE FROM 1989
Dédougou	71	85	-16
Koudougou	70	84	-16
Bobo-Dioulasso	72	76	-6
Ouagadougou	80	77	5
Pouytenga	73	65	12
Ouahigouya	86	74	16
Fada N'Gourma	68	55	24
Kaya	90	60	51
Markoye	129	74	74

SOURCE: OFNACER

If the cereal balance estimates in Table 4 are accurate Yatenga, Passoré, Soum and Gnagna provinces will have had two consecutive years of below average cereal deficits. Women and children of smallholder farm households in these provinces will be extremely vulnerable to food shortages in 1990/91.

Economic Data

Cereal prices increased at a normal rate for the April-July period (see Table 5 above). July millet prices were highest in northern Burkina where transportation is difficult in the rainy season. In Markoye, for example, a millet price of 127 West African Francs per kilogram (FCFA/kg) is usual during the rainy season. Prices between 60 and 80 FCFA/kg exist in southern markets while northern market prices range between 80 and 90 FCFA/kg. It is too early in the season for prices to reflect expectations concerning the current agricultural year. However, if prices do not drop significantly in November, it will reflect low confidence in the outcome of the 1990/91 harvest.

Purchasing power declined slightly in the sahelian zone because gold mining activities are prohibited in the growing season. However, the livestock market is good. The other major source of household purchasing power is remittances from family members working in other countries or urban

areas of Burkina. There has been no change in this income source during the past few months.

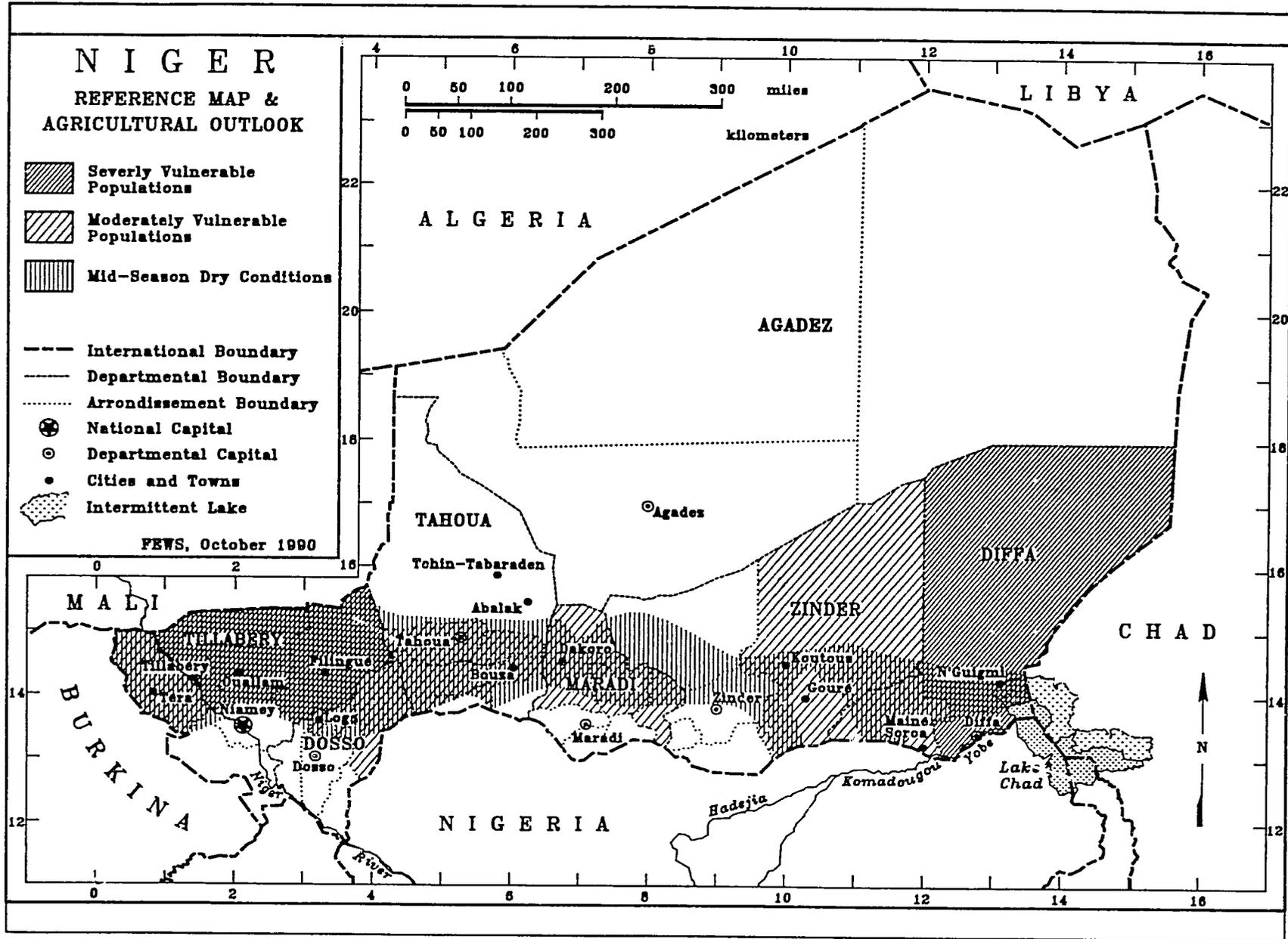
Update on Extremely Vulnerable "At-Risk" Populations

Smallholder agriculturists in northern Yatenga, Soum, Oudalan and Séno were listed as Extremely Vulnerable in the FEWS June 1990 Vulnerability Assessment. These groups have recently received food aid from the GOB. However, if the FEWS cereal production estimates for Yatenga are correct, there will be a 59,000 mt cereal balance deficit in that province. This would be the worst provincial deficit since 1985 and would cause widespread suffering. A similar possibility exists in Soum Province. Information from the CRPA indicates that Séno Province will have adequate cereal and forage production this year. This will help restore household financial resources in this province that had been declining over the past year.

Conclusions

FEWS estimates a 1990/91 cereal balance deficit of 122,000 mt for Burkina. This deficit, caused by decreased 1990/91 production, will induce financial hardship and reduced purchasing power, thereby increasing food insecurity in most of Burkina. Provinces that were deficit in 1989/90 and have estimated deficits in 1990/91 will experience severe food-access related stress, especially among smallholder agriculturalists. Emergency assistance will be needed for Yatenga, Soum, Gnagna and Passoré provinces where cereal deficits have been below average for two consecutive years. Part of the cereal deficit can be met by GOB resources. However, the GOB does not have sufficient resources to fully cover the estimated deficit and GOB requests for emergency donor assistance may be anticipated.

As the production season continues to progress additional information will become available. The FAO Global Information and Early Warning System plans a series of crop assessment missions in October. They will collaborate with CILSS and the MAE/DEP to standardize reporting methodologies. They will also support the efforts of MAE/DEP in producing the official GOB 1990/91 cereal production estimates. These estimates will be published in November. Another important indicator to follow is the magnitude of the drop in cereal prices in November. This will give an indication of the market's perception of the quality of the harvest (good, average, or poor).



NIGER

Poor Harvest May Mean Local Food Shortages by Early 1991

USAID and FEWS/Niger Report Received in Washington September 21, 1990

Summary

A potentially poor 1990 harvest, combined with a poor 1989 harvest, has depleted household resources and may lead to increased food insecurity in many regions of Niger in 1991. By May 1991 an estimated 1.1 million people may become "at-risk" (see Key Terms) to food insecurity. Food assistance needs for this at-risk population may approach 141,000 metric tons (mt), of which 56,000 mt could come from in-country stocks. The remaining 85,000 mt would need to be purchased locally or imported. Program assistance to areas in the northern Tillabéry and Diffa departments would be required by early 1991. Mitigation projects should start as early as March 1991, in a zone that includes large parts of Tillabéry, Tahoua, Dosso, Muradi and Zinder departments (see Map 5).

Factors Affecting Food Availability

Agricultural Conditions

The 1990/91 agricultural season began with early and heavy precipitation. A dry period followed in late June, with adequate rains in early and mid-July and little or no rain in late July and most of August. Rainfall since late August has generally increased in frequency, but has not been well-distributed spatially. Planting also began early, particularly in Tahoua, Dosso, Maradi and southern Zinder departments, but overall planting was not completed until mid-July. Some areas, such as northern Téra, Ouallam and Filingué arrondissements were still planting in early August.

The initial planting period was followed by the late July and August dry conditions which resulted in severe moisture stress, retardation of plant development, and pest damage. Dry conditions served to concentrate grasshoppers in crop lands and exacerbated damage by other pests (e.g., stem borers and seed suckers). The impact of the dry period appears to have been particularly severe, as most plants were

either in the main growth stage or producing seeds, particularly millet.

These dry conditions generally affected an east-west zone that includes the central and northern sections of the main cereal producing regions of Niger, stretching from the Burkina border to east of Gouré (see Map 5). Similarly affected agricultural areas south of this zone include most of Loga, northern Dogondoutchi (Dosso Department) and southwestern Gouré arrondissements (Zinder Department). Although late August and September rainfall improved soil moisture conditions, overall production prospects in the affected areas are below average. Production prospects in areas not noted as being affected by dry conditions are estimated to be near average.

In the absence of quantitative figures on area cultivated and yield, the 1990/91 cereal production estimate presented in Table 1 reflects an assessment of the agricultural season based on rainfall data, AGRHYMET greenness maps (NDVI, see Key Terms), and anecdotal field reports. USAID/Niger used this information to qualitatively place the 1990/91 agricultural season within one of three categories corresponding to (1) average, (2) below average, or (3) poor. Different historical cereal production averages were used depending upon the rating for a particular arrondissement (see Notes of Table 1 for details).

National rainfed cereal production for 1990/91 is estimated at approximately 1.33 million mt using this method. This figure represents a production deficit over consumption needs of about 359,000 mt (21% of national consumption needs). Potential surplus production over arrondissement needs occurs in only eleven of forty-two arrondissements (see Table 1). Areas where production could possibly meet less than half of 1990/91 consumption needs include all of Diffa department and Ouallam and Filingué arrondissements of Tillabéry Department.

Pastoral Conditions

Pasture development has been poor, except in a few areas. The ability of pasturage to support livestock is below average

Table 1: Preliminary Estimate of Rainfed Cereal Production for 1990/91 (in mt, except population)

DEPARTMENT and Arrondissement	Population 1991	Net Prod. mil/sor.	Consump. 1990-91	Balance
AGADEZ TOTAL	240,925	806	45,776	(44,970)
Agadez City	64,030	1	12,166	(12,165)
Tchirozérine	77,660	720	14,755	(14,035)
Arlit	89,957	85	17,092	(17,007)
Bilma	9,278	0	1,763	(1,763)
DIFFA TOTAL	198,451	8,729	41,094	(32,365)
Diffa City	19,106	0	3,630	(3,630)
Diffa ²	65,216	2,113	14,035	(11,922)
N'Guigmi ²	29,303	491	5,989	(5,498)
Mainé-Soroa	84,826	6,125	17,440	(11,315)
DOSSO TOTAL	1,139,749	233,859	247,976	(14,117)
Dosso City	35,635	0	6,771	(6,771)
Dosso	241,992	58,607	52,958	5,649
Boboye	228,312	46,083	50,229	(4,146)
Loga ¹	98,235	20,233	21,508	(1,275)
Dogondoutchi ¹	353,196	66,362	76,905	(10,543)
Gaya	182,379	42,574	39,605	2,969
MARADI TOTAL	1,551,325	295,400	332,081	(36,682)
Maradi City	145,678	0	27,679	(27,679)
Madarounfa	211,040	52,522	45,745	6,777
Guidan Roumji	237,079	59,039	52,072	6,966
Dakoro ¹	285,566	46,835	61,282	(14,447)
Mayayi ¹	246,270	44,443	53,887	(9,444)
Aguié	189,204	41,093	40,492	601
Tessaoua ¹	236,488	51,468	50,924	544

DEPARTMENT and Arrondissement	Population 1991	Net Prod. mil/sor.	Consump. 1990-91	Balance
TAHOUA TOTAL	1,413,946	228,750	299,038	(71,848)
Tahoua City ¹	59,172	0	11,243	(11,243)
Tahoua ¹	207,162	30,534	44,905	(14,371)
Illéla ¹	188,882	28,177	40,921	(12,744)
Keita ¹	167,976	25,987	36,839	(10,852)
Bouza ¹	191,125	32,648	42,048	(9,400)
Madaoua	240,947	43,328	50,211	(6,883)
Konni	280,596	58,815	58,035	780
Tchin-Tabaraden	78,086	9,261	14,836	(5,575)
TILLABERY TOTAL	1,930,595	258,425	406,586	(148,161)
Niamey City	455,725	2,501	86,588	(84,087)
Kollo	275,259	62,625	59,402	3,223
Say	189,406	44,265	41,669	2,596
Téra	322,892	59,504	68,654	(9,050)
Tillabéry ¹	166,292	27,172	36,269	(9,097)
Ouallam ²	206,341	20,190	45,198	(25,008)
Filingué ²	314,680	42,068	68,806	(26,738)
ZINDER TOTAL	1,552,638	306,744	327,911	(21,167)
Zinder City	147,405	1,673	28,734	(27,061)
Myriah	463,897	96,126	100,441	(4,315)
Magaria	380,320	84,766	79,622	5,144
Matameye	182,116	38,378	39,239	(861)
Tanout	205,422	61,833	42,793	19,040
Gouré ¹	173,478	23,968	37,082	(13,114)
NIGER	8,027,629	1,332,711	1,700,462	(359,310)

SOURCE: Demographic data from the 1988 census with extrapolations to 1991 by FEWS/Niger; Gross production data from the Division of Agricultural Statistics in the Ministry of Agriculture; Net production accounts for 15% seed, feed and post harvest losses; Consumption requirement from USAID/Niger at 190 kilograms per person per year (kg/per/yr) for pastoralists and 220 kg/per/yr for agriculturalists.

Notes: USAID production ratings were based on rainfall data, AGRHYMET greenness maps, and anecdotal field reports, and unless noted as below, all are based on average 1980-90 millet and sorghum production. Exceptions: ¹ Average of "below average" production years between 1980-90, excluding worst year; ² Average of all "below average" production years between 1980-90, including worst year.

USAID/Niger population figures depart slightly from GON figure because of different extrapolation methods. USAID/Niger applies arrondissement specific growth rates, while the GON uses the national growth rate for each arrondissement. Arrondissement specific rates vary considerably from the national growth rate and account for the differing total population figures. The USAID/Niger Mission and FEWS adhere to arrondissement specific growth rates in order to better ascertain disaggregated food needs.

due to a lack of vegetative development and surface water supplies. Areas which had near normal pasture development include Tchín-Tabaraden Arrondissement, a zone between Abalak and Dakoro, the area north of Gouré (Koutous), parts of north central Diffa Department and most of Agadez Department. The shortage of rain in late July and August caused even the areas of near normal pasture development to suffer from early drying. Late August and September rainfall improved local surface water supplies, but appears to have come too late to cause significant regeneration of vegetation.

Food Stocks and Flows

The Government of Niger (GON) plans to reconstitute the national security stock to the statutory limit of 80,000 mt following the harvest. Two-thirds of this total (i.e., 53,000 mt) can be used for food assistance with the remainder retained for long-term reserve requirements. Donor food stocks for 1990/91 are composed of 10,000 mt of programmed World Food Program (WFP) sorghum and 3,000 mt of United States sorghum carried over from 1990 due to late distributions. The European Economic Community (EEC) has promised 15,000 mt of wheat for sale with the proceeds used to finance security stock purchases, although this figure is counted as expected imports in cereal balance exercises.

Considerable quantities of cereals entered Nigerien markets from Nigeria in 1989/90. Neither qualitative nor quantitative information is available on 1990/91 cereal production prospects in northern Nigeria. At this writing available data are inadequate to evaluate the impact of the Nigerian cereal supply situation on markets in Niger.

Intra-Niger cereal flows will be limited in 1990/91 due to reduced carryover stocks from the mediocre 1989/90 harvest and the anticipated poor 1990/91 harvest. Production from Dosso, Maradi and Zinder departments that flowed to Tillabéry, Tahoua and Diffa departments in 1989/90 will probably remain within their regions of origin in 1990/91. Any on-farm stocks will likely be held against late season needs, even in areas which are expected to have average production.

Factors Affecting Food Access

Projected Food Consumption Needs

Estimated cereal consumption needs for 1990/91 are approximately 1.7 million mt. This figure was obtained by multiplying projected population figures by annual per capita cereal requirements. FEWS/Niger population projections are arrondissement-specific and use exponential growth rates derived from the 1977 and 1988 censuses. Per capita cereal consumption figures follow USAID/Niger practice of using 190 and 220 kilograms (kg) per person per year for pastoral/urban and agricultural populations, respectively.

Table 2: Projected Cereal Availability in 1990/91 (in mt, except population)

Date	9-15-90
Agricultural Year	1990/91
Per Capita Cereal Consumption (kg/cap/yr)	190/220
Population	8,027,629
Total Consumption Requirement	1,700,462
Net Rainfed Production	1,332,711
Net Irrigated Production	50,000
Net Off-Season Production	20,000
Net Domestic Cereal Production	1,402,711
Public Working Stocks	1,000
Security Stocks	53,000
Commercial Stocks	67,000
On-Farm Stocks	115,000
Donor Stocks	13,000
Total Available Stocks	249,000
Total Commercial Cereal Imports	60,000
Total Cereal Exports	0
Net of Stocks, Imports, Exports	309,000
Domestic Cereal Supply	1,711,711
Cereal Balance	11,249

SOURCES: Demographic data from the 1988 census with extrapolations to 1991 by FEWS/Niger; Gross production data from the Division of Agricultural Statistics in the Ministry of Agriculture; Net production accounts for 15% seed, feed and post harvest losses; Consumption requirement from USAID/Niger at 190 kg/per/yr for pastoralists and 220 kg/per/yr for agriculturalists.

NOTES: Consumption requirement, rainfed production estimate and population extrapolation as in Table 1; Irrigated and off-season production estimates from 1989/90; Stocks include public working stocks from the national rice parastatal, two-thirds of public reserve stocks (security stock), commercial stocks estimated at 1989/90 levels, and on-farm stocks estimated at half the positive balance from the 1989/90 production surplus; Public working, security and donor stocks and commercial imports figured as of September 15, 1990; Data on commercial imports from Nigeria were not available; 15,000 mt of wheat promised by the EEC is noted as part of commercial imports (see text).

The provisional national-level cereal balance projection presented in Table 2 indicates that cereal availability, despite sub-regional production shortfalls, may be adequate at the national level during 1990/91. The projected net domestic cereal production of approximately 1.3 million mt does not cover the estimated 1.7 million mt consumption requirement.

However, available stocks (249,000 mt) and anticipated commercial imports (60,000 mt) bring the final cereal balance estimate to about an 11,000 mt surplus.

Despite this estimated national cereal surplus, Niger will face difficulty in meeting food needs in specific regions without additional imports of approximately 88,000 mt and the use of the 53,000 mt security stock for a total of 141,000 mt. This assessment is based on historical experience from the 1987/88 and 1989/90 crop years, the existence of a thinly traded cereal market in Niger, and diminished disposable income due to continued economic recession in 1990/91.

Economic Data

Cereal prices have been generally stable throughout Niger with urban markets displaying the expected seasonal peaks of June and July. Although peak 1990 prices were substantially higher than 1989, they are not much different than average for the period. Millet prices have been remarkably stable in deficit zone markets with the expected seasonal peaks occurring only in the markets of Filingué (Tillabéry Department), Loga (Dosso Department), Bouza (Tahoua Department), and N'Guigmi (Diffa Department). Millet prices throughout most of Niger decreased in August with the appearance of publicly held stocks on the market.

It is unclear if stable and moderate prices throughout most of the country reflect regular cereal flows or reduced demand, because information on marketed quantities is not available. In some areas of Niger, low and stable prices may be due to reduced demand caused by insufficient purchasing power, even if on-farm food supplies are exhausted. For example, Mainé-Soroa and Diffa arrondissements were rated extremely vulnerable to food insecurity in the June 1990 Vulnerability Assessment due to limited purchasing power and exhausted food stocks. Rural markets in these arrondissements exhibit surprisingly low and stable prices compared to the rest of the country.

Filingué and Tillabéry markets registered the maximum cereal price in Niger for both July and August at 97 West African Francs (FCFA) per kg. Prices have remained high in Filingué, Tillabéry and N'Guigmi. High prices in Filingué, Tillabéry, and N'Guigmi arrondissements may increase the vulnerability level of their populations by reducing purchasing power. These arrondissements were rated moderately vulnerable in the June 1990 Vulnerability Assessment.

Update on Extremely Vulnerable "At-Risk" Populations

USAID/Niger projects high vulnerability to food access problems in Tillabéry, Ouallam and Filingué arrondissements (Tillabéry Department) and Diffa and N'Guigmi arrondissements (Diffa Department). This projection is based upon the poor 1989/90 harvest, an expected poor harvest in 1990/91 and limited access to food through commercial chan-

nels due to thinly traded markets and low disposable incomes. Food assistance for 15% of the population (120,100) will be required by January 1991 to minimize unusual migration from these areas. By May 1991 assistance will be needed for 50% of the population in these areas (400,500). Total food assistance needs in highly vulnerable regions are estimated at 53,000 mt, which will need to be available through non-commercial channels (e.g., free allotments, food for work, subsidized sales, etc.).

Conditions in the three arrondissements of Tillabéry Department are considered potentially more severe in view of civil unrest further north in Mali. Immigrants from areas of unrest searching for food are anticipated and will exacerbate the vulnerability status in these arrondissements. Further east in Tchintabaraden Arrondissement (Tahoua Department) 6,500 repatriated Tuaregs are receiving food assistance from WFP. Multiple international donors have also contributed to this effort.

Other arrondissements in the zone affected by dry conditions (see Map 5) are considered to be moderately vulnerable to food access related problems. Expected production, carry-over stocks and purchasing power in these areas are deemed adequate to meet food needs until Spring 1991. However, most of these areas will require some form of assistance to address food shortages before the 1991 harvest. USAID/Niger estimates 28% of the population in these moderately vulnerable areas (665,000) will require 88,000 mt of food assistance through non-commercial channels from April to September 1991. A near-average harvest is projected for areas not already mentioned. The remaining arrondissements will not experience severe food insecurity unless immigration of populations seeking food occurs on a large scale.

Conclusions

Approximately 14% of Niger's population will require some form of food assistance by October 1991. Below average harvests are projected in areas containing over 40% of Niger's population. This represents the second poor harvest in a row. Carry-over stocks and other resources to mitigate food shortages have been previously exhausted. Areas of special concern are Diffa and northern Tillabéry departments which are experiencing their second consecutive food shortage situation.

The GON currently has access to only 3,000 mt of cereal (USAID Title II sorghum) for targeted food assistance efforts which should cover needs through January 1991. New donor assistance will then be required for releasing the 53,000 mt security stock and purchasing additional cereals to meet outstanding food assistance needs.

Assuming complete and efficient utilization of the security stock, additional food assistance (West African regional procurements or non-African imports) will be required at field sites by May 1991. A more complete projection of external food procurement requirements will be available in November 1990.

The projected rainfed cereal production deficit of about 350,000 mt is historically significant, but the expected 141,000

mt of food assistance needs in specific regions of Niger is not unusual (88,000 mt of imports and 53,000 mt from the security stock). However, if production is below projections in this report or anticipated commercial supplies do not reach expected levels, then serious shortages will develop within Niger by early 1991. This evolving situation will be closely monitored and described in subsequent reports.

USAID/Niger Mission Comments and Caveats:

The 1990 Agricultural Outlook for Niger was developed without up-to-date cereal production, yield and area planted data. Rainfall in Niger for 1990 has been near average in many areas. However, this apparent normality masks the negative effects of a widespread dry period in the middle of the growing season. The impact of this dry period cannot be accurately projected and the USAID/Niger Mission has had to resort to a "best guess" approach in projecting future food supplies and needs. The projections in this report will be updated in future FEWS reporting as more information becomes available. The 1990 Agricultural Outlook for Niger is an "early warning" report that projects what might happen and is not to be construed as a definitive statement of problems and needs.

Background Notes to Determining Vulnerability Update:

The numbers of severely and moderately vulnerable persons and their food needs were calculated as described below. This procedure is based on the best available data on cereal consumption patterns during periods of food access stress. Per capita cereal needs was based on 220 kg/person/year (all vulnerable populations were assumed to be agriculturalists). These figures are adjusted for reductions due to seasonal migrations, and production, gifts and commercial resources. It is assumed that the populations which migrate from a region return at the beginning of the next rainy season with adequate resources to meet their own food needs.

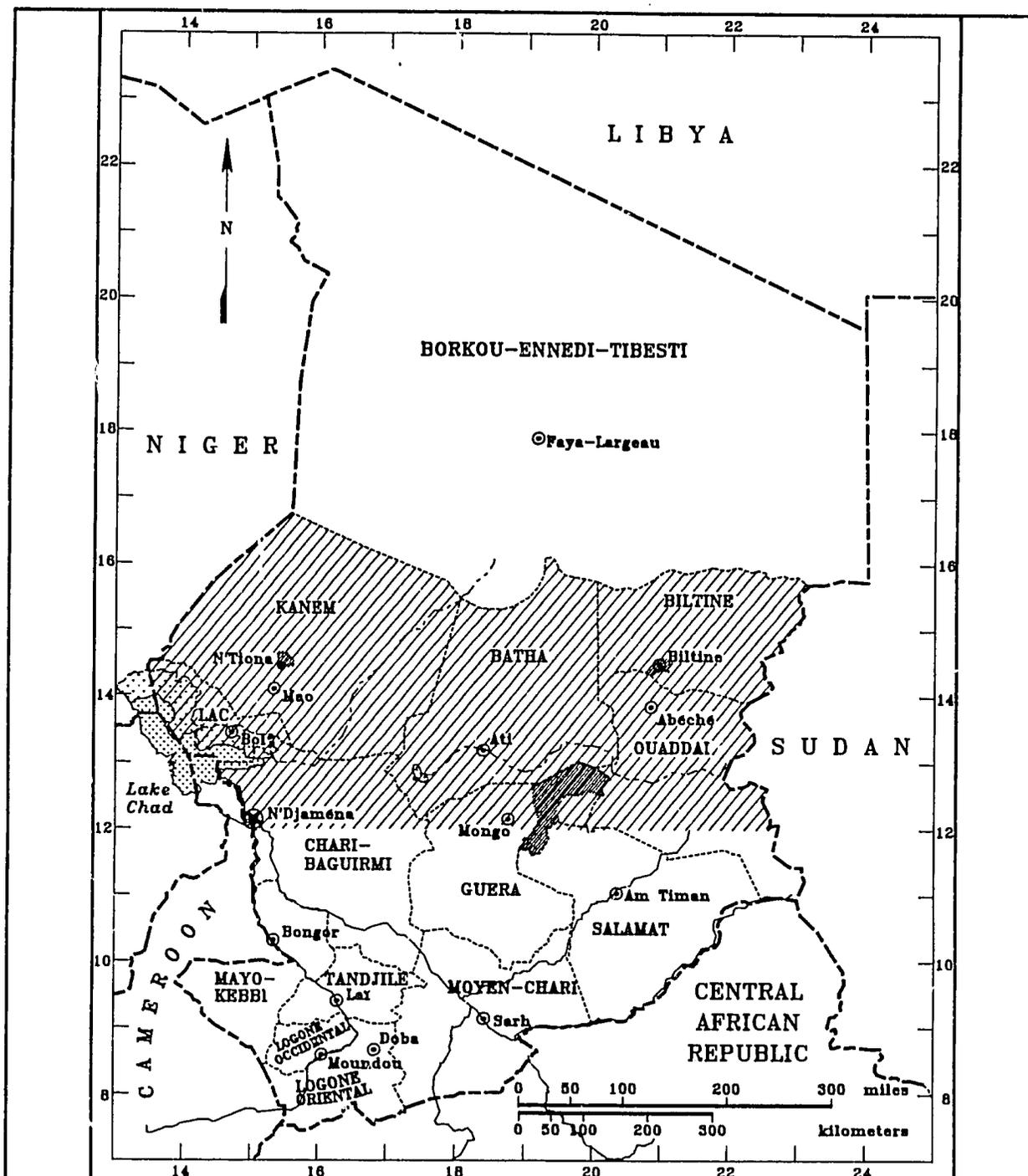
SEVERELY VULNERABLE

For arrondissements classified as severely vulnerable, 50% of their population is assumed to migrate at the end

of a normal harvest. Of the remaining population, 10% are assumed to have adequate resources (income independent of agriculture), 60% moderate food supplies and economic resources (sufficient for six months) and 30% minimal resources. These three classifications represent 5%, 30% and 15%, respectively, of the total population. The moderate resources group is expected to acquire no more than 40% of their cereal needs from production, gifts and commercial sources. The minimal resources group is estimated to acquire no more than 20% of their food needs from these same sources. Non-commercial food needs are then calculated by multiplying the annual cereal consumption needs by the number of persons in each classification (using Table 1 population figures) and finally multiplying by the percentage of food needs assumed not met from production, gifts and commercial sources (80% for minimal resources group, 60% for the moderate resources group).

MODERATELY VULNERABLE

For arrondissements classified as moderately vulnerable, 30% of the population is assumed to migrate after a normal harvest. Of the remaining population, 30% are assumed to have adequate access to cereal throughout the season, 30% are largely self-sufficient in terms of production and can acquire cereal through economic or social mechanisms, 35% have insufficient production, gifts and commercial sources to make it more than two-thirds through the consumption year, and 5% have minimal resources. These three classifications represent 21%, 21%, 24.5% and 3.5%, respectively, of the total population. Non-commercial requirements for populations in moderately vulnerable arrondissements are determined in an identical manner to that outlined above for the severely vulnerable.



CHAD REFERENCE MAP & AGRICULTURAL OUTLOOK

- ⊗ National Capital
- ⊙ Prefecture Capital
- Cities and Towns
- International Boundary
- - - Prefecture Boundary
- · - Intermittent Drainage
- ⊘ Intermittent Lake
- ▨ At-Risk Populations
- ▧ Poor Outlook



FEWS, October 1990

Map 6: Chad Reference Map

CHAD

Drought Conditions in Northern Sahel

USAID and FEWS/Chad Report Received in Washington September 18, 1990

Summary

By mid-September, prospects for an adequate cereals harvest for Chad were diminished by the rapid retreat of the intertropical convergence zone (ITCZ-see Key Terms), resulting in a drastically shortened rainy season for areas north of the twelfth parallel. Generalized wilting and abandonment of rainfed millet fields has been reported in Biltine, north Ouaddaï, Batha, Kanem and eastern Lac prefectures. However, prospects for an adequate cereals harvest south of this line are still good if rains continue through September. Stabilization of the ITCZ seen during the first half of September may make this possible.

The USAID/Chad and FEWS' Vulnerability Assessment identified 19,000 persons in May 1990 who were experiencing critical food supply problems in Kanem (Dogorda Canton) and Guéra (Moubi Hadaba and Moubi Goz cantons) prefectures (see Map 6). This figure was increased to 38,000 persons in June and July as additional information was obtained from the field. Food aid was distributed in small amounts to assist these "at-risk" (see Key Terms) populations until the 1990 harvest. Given a projected 1990 crop failure in these and adjacent zones, the number of persons experiencing severe food access related stress will significantly increase.

Factors Affecting Food Availability

Agricultural Conditions

The 1990 rainy season was characterized by a late and slow start, followed by improved conditions in June and July. Cumulative rainfall through August indicates that the 1990 season is worse than the 30-year average (see Table 1). In some cases the cumulative rainfall is worse than in 1987, which was a bad year for Chad's Sahelian Zone (see Map 6). Only a few areas in Chad's Sahelian Zone will receive the minimum 300 millimeters (mm) of rain required for millet production.

Table 1: Comparative Rainfall Thru 8/31/90

STATION	REGION	CUM. RAIN FALL	30 YR. AVG. CUM.	% DEV.	
				30-YR MEAN	1987 CUM.
Sahelian Zone					
Nokou ¹	Kanem	72.5	241.6	-70	NA
Moussoro	Kanem	95.1	285.8	-67	-54
Djédaa ¹	Batha	120.8	330.1	-63	NA
Abéché	Ouaddaï	149.4	367.5	-59	8
Adré ¹	Ouaddaï	232.7	458.1	-49	NA
Ati	Batha	181.5	349.1	-48	-20
Biltine	Biltine	137.6	258.4	-47	-26
Arada ¹	Biltine	85.5	160.1	-47	NA
Am Zoer ¹	Biltine	150.8	281.1	-46	NA
N'Djaména	Ch. Bag.	284.9	479	-41	-15
Mao	Kanem	185.4	294.4	-37	61
Bouso	Ch. Bag.	443.6	702.7	-37	-10
N'Gouri	Lac	173	273.7	-37	34
Goz Beida ¹	Ouaddaï	380.3	519.1	-27	NA
Am Timan	Salamat	507.5	690.3	-26	NA
Melfi ¹	Guéra	553.2	630.6	-12	NA
Sudanian Zone					
Guélandeng	M. Kebbi	382.4	615.6	-38	-1
Koumra	M. Chari	510.7	816.5	-37	-21
Sarh	M. Chari	502.2	772.9	-35	-19
Moundou	L. Occ.	612	847.8	-28	-17
Doba	L. Orient.	774.7	851.2	-9	6
Pala	M. Kebbi	897.7	784.7	14	45

SOURCE: GOC Meteorological Division (DREM);
Note: ¹ Rainfall data provided by Système d'Alerte Précoce (SAP), an EC-funded Early Warning Project.

Figure 3: 1990 Change in NDVI between August 10th and 31st

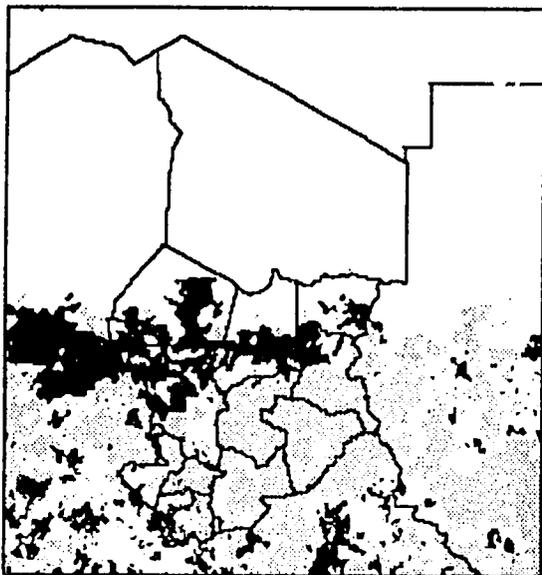
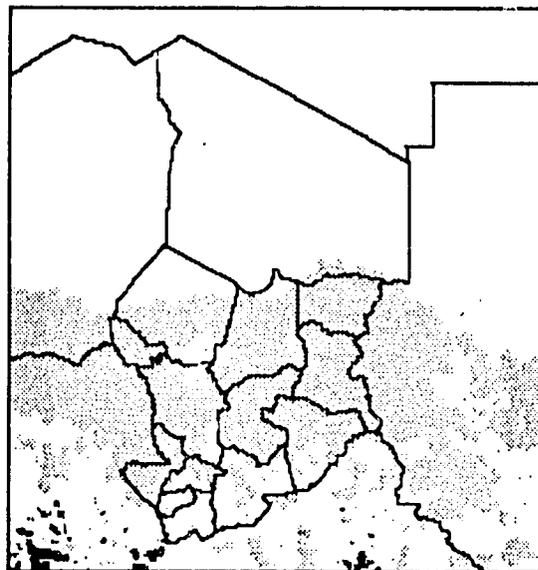


Figure 4: Normal Change in NDVI between August 10th and 31st



Dark shading indicates decline; light shading indicates increase.

The below normal rainfall will result in a poor to mediocre harvest of rainfed cereals in 1990. Other factors likely to contribute to decreased 1990 production include reduced acreage devoted to recessional agriculture and crop damage from grasshoppers. The Chadian Crop Protection Service reports significant, albeit localized, damage to crops in Chari Baguirmi, Ouaddaï, Batha, Guéra, Lac, Mayo Kebbi and Moyen Chari prefectures.

METEOSAT (see Key Terms) images show July rainfall as being adequate, though still less than the thirty-year average (1951-80). However, the ITCZ slipped south several degrees below its normal position for the beginning of August, resulting in a general decline in the amount of rainfall. METEOSAT images indicate that rainfall peaked near the end of July, whereas it should normally peak around mid-August. NDVI (see Key Terms) values for most of the country started declining in mid-August. Figure 3 shows that this decline was more pronounced in areas between 13 and 15 degrees north latitude. For comparison, Figure 4 indicates that the historic trend for this August period is an increase in NDVI for the entire Sahelian Zone, rather than the decrease found in 1990 (the historic period runs from 1982 to 1989). Areas south of the 13th parallel in the Sahelo-sudanian and Sudanian zones, though subjected to decreased amounts of rainfall, could still produce satisfactory harvests.

Given the station rainfall data, METEOSAT, and NDVI indicators outlined above, cereal production for the 1990/91 agricultural season will likely approximate that registered in 1987 (500-600,000 metric tons). This assumes that rains will

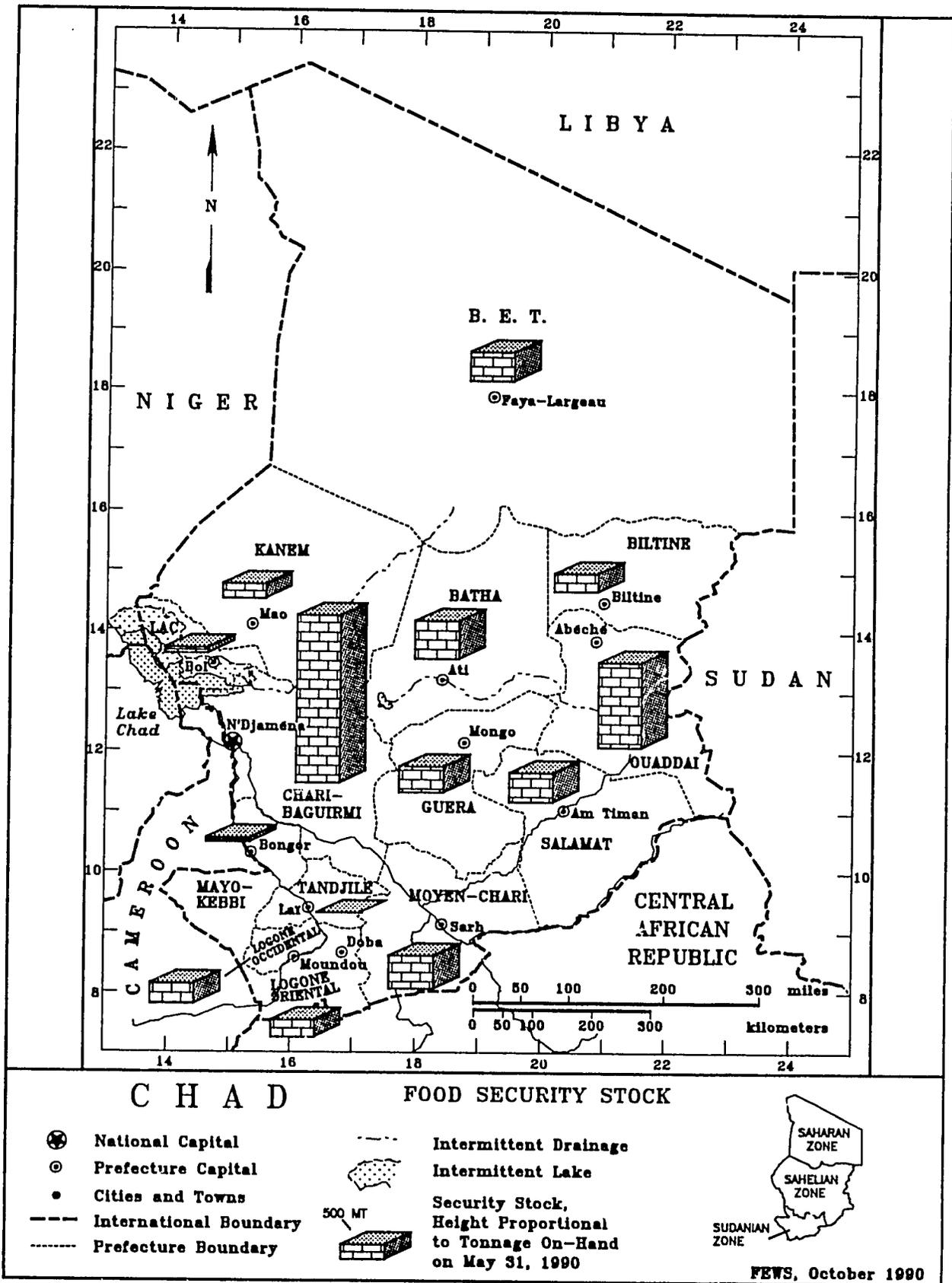
continue in the Sahelo-sudanian and Sudanian zones through September.

Pastoral Conditions

Adequate July rainfall caused germination and development of pastoral vegetation in Chad's Sahelian Zone that, by the beginning of August, was generally better than the 1982-89 average. The exception was the area north of Ati in Batha Prefecture. During the period August 11-20 (second dekad), the Ministry of Livestock's ground observation teams reported the start of declining pastures. This can be directly related to the premature retreat of the ITCZ, resulting in diminished rainfall. Most pastureland north of the 13th parallel was dry by the end of August. NDVI images confirm a general biomass decrease in that area beginning in the third dekad of August. However, according to the Ministry of Livestock, dry season fodder looks good and no major incidents of animal illness have been reported. Thus, livestock resources can be expected to play an important role in providing access to cereals for Chad's agro-pastoralists in the northern sahel where rainfed crops have failed.

Food Stocks and Flows

An emergency food security stock totaling 16,627 metric tons (mt) of local cereals is distributed across fourteen locations throughout Chad (see Map 7). This stock was bought with Japanese, Dutch and Belgian cash grants and may be used to meet emergency feeding requirements as they arise. In addition, local currency generated from the sale of 5,000 mt of United States wheat flour (equivalent to \$2.6 million)



Map 7: Chad Food Security Stock Map

can be used to buy cereals from surplus regions for emergency distribution and to pay ancillary costs. Since 1985, the Japanese have annually granted Chad 3-5,000 mt of rice through the World Food Program (WFP). The likelihood of a 1991 grant is high.

The level of village and commercial private stocks is always difficult to estimate. Although price increases at this time of year are normal, the present rate of increase suggests that stocks are adequate. During the past ten-month period, general cereal prices have risen only slightly, with the average price in sahelian markets gradually increasing from 49 West African Francs (FCFA) per kilogram (kg) in October 1989 to 59 FCFA per kg in July 1990. However, a few localized areas in Kanem, Guéra and Biltine prefectures have depleted their reserves and resorted to desperate measures, such as opening termite mounds to retrieve grain. This is the exception rather than the rule. Reports appearing in the monthly European-Community funded early warning system (Système d'Alerte Précoce - SAP) bulletin indicate good to average reserves in most localities. For example, anecdotal information from some areas in Batha Prefecture indicate families produced as many as 100 bags (100 kg each) of grain in 1989/90. The private cereal stock situation is extremely heterogeneous and so site-specific as to render extrapolation impossible. However, the absence of significant migration from areas north of the 13th parallel reinforces the impression that resources still exist and are being used to gain access to cereals.

Factors Affecting Food Access

Projected Food Consumption Needs

A census has never been conducted in Chad. Hence, calculation of food consumption needs does not yield satisfactory results. Neither total population nor per capita cereals consumption figures are known. The recent nation-wide voter registration drive identified significant differences between official and measured population figures. As a result, the Ministry of Public Health has increased its population figures in some regions about 95%, while decreasing others by approximately 78%. Given the imprecise demographic data, calculation of national or regional cereal requirements is highly inaccurate. The World Bank states that cereals balance sheets provide an overly pessimistic picture in Chad. An alternative methodology proposed in this report is to identify vulnerable groups and estimate their emergency feeding requirements.

Update on Extremely Vulnerable "At-Risk" Populations

Approximately 38,000 persons have been considered Extremely Vulnerable to food stress since the 1989 harvest. The four areas in which these vulnerable populations were located are flagged by SAP and reported in the 1990 Vulnerability Assessment (see Table 2).

Table 2: Extremely Vulnerable populations

Prefecture	Sub-Prefecture	Canton	Population "At-Risk"
Kanem	Nokou	Dogorda	4,000
Guéra	Mangalmé	Moubi Hadaba	15,000
Guéra	Mangalmé	Moubi Goz	
Guéra	Mangalmé	Dadjo II	8,900
Guéra	Biltine	Ouled Djama	10,000
Total			37,900

SOURCE: Système d'Alerte Précoce (SAP)

The populations residing in the areas listed in Table 2 will remain extremely vulnerable to food stress in 1991, because they are unlikely to obtain an adequate 1990/91 cereals harvest. Adjacent areas in Kanem, Guéra, Biltine, north Ouaddaï and Batha prefectures may soon be included in the Extremely Vulnerable classification. The people in these areas were previously identified as being Moderately Vulnerable due to a mediocre to poor 1989/90 harvest. SAP project personnel will gather additional field information during the coming months to pinpoint peoples and areas where food aid assistance should be provided.

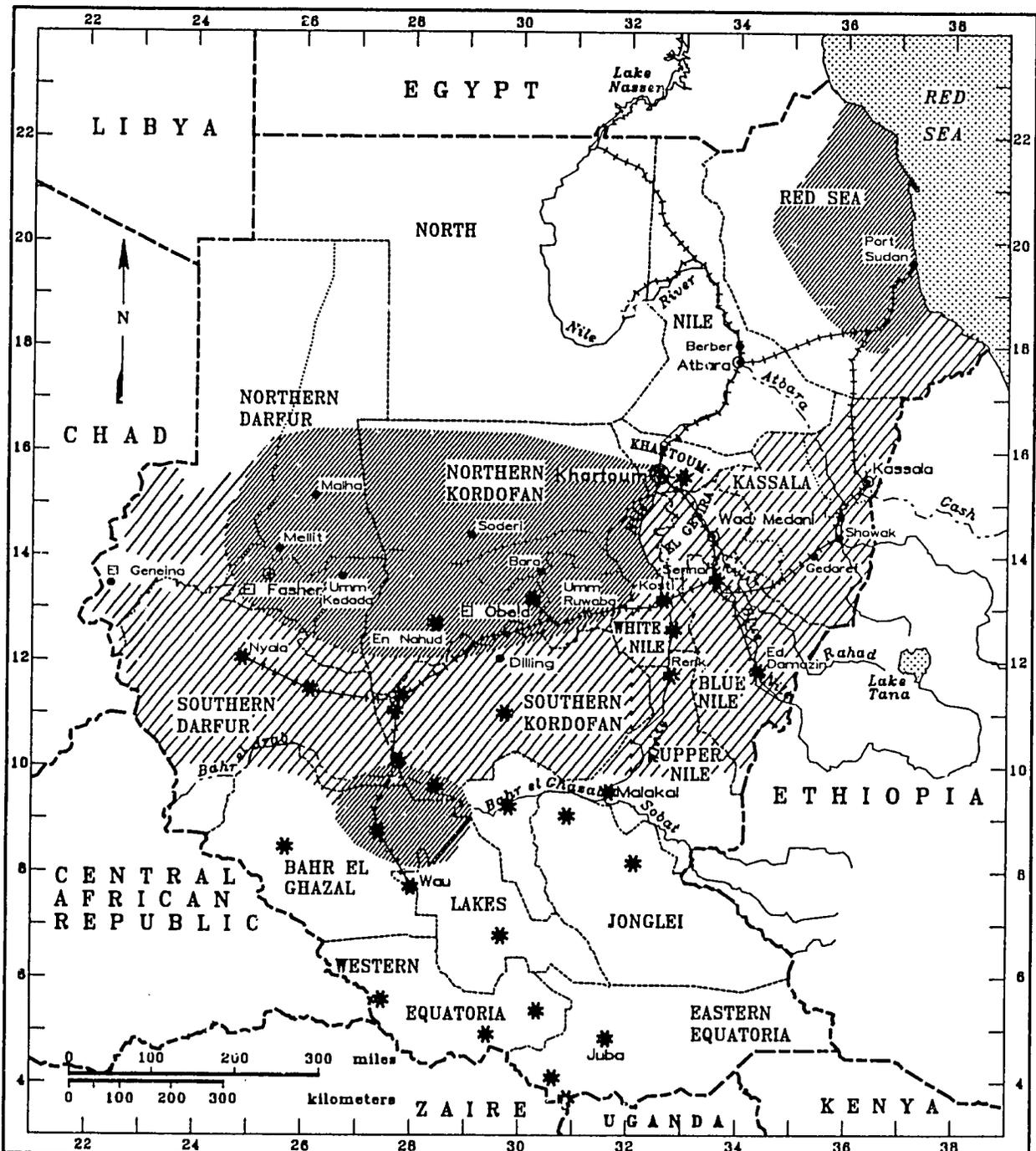
For planning purposes, note that the regions most severely affected by inadequate 1990 rainfall are sparsely populated and agriculturally marginal. Assuming that the number of "at-risk" persons requiring food aid would increase approximately three-fold (from 38,000 to 120,000), then 1,440 mt of food aid would need to be distributed per month. If food aid were to be provided during the critical six month lean period (*la soudure*), then 8,600 mt would have to be drawn from the existing 16,600 mt in-country food security reserves.

Conclusions

Failure of rainfed crops due to inadequate rainfall in areas north of the 12th parallel will increase Chad's "at-risk" population and necessitate closely-targeted food aid distributions in 1991. Pastoral activities are the economic mainstay of these agriculturally marginal areas, so crop failure by itself does not necessarily spell disaster. Pasture is generally adequate and livestock resources will continue to ensure access to cereals for some vulnerable groups. Nonetheless, a general crop failure in 1990/91 is the second in a row for some regions and will heighten vulnerability levels of people remaining in these areas. Seasonal migration is common and likely to increase during the coming months. Socioeconomic and health data will continue to be collected

in these areas by the SAP project, with particular attention paid to childhood malnutrition rates. This data will provide the Government of Chad/Donor Food Aid Action Committee with a basis for informed targeting of food aid distribu-

tions from the food security reserve. In the Sahelo-sudanian and Sudanian zones (south of the 12th parallel), prospects for a satisfactory harvest are contingent upon continued rainfall through September.



S U D A N R E F E R E N C E M A P & A G R I C U L T U R A L O U T L O O K

- National Capital
- ⊙ Regional Capital
- Cities and Towns
- +—+— Railroad
- - - International Boundary
- - - Regional Boundary
- - - Provincial Boundary

- Selected Districts/Area Councils
- * Relief-Dependent Displaced People
- ▨ Populations At-Risk
Food Aid Required Now
- ▧ Crops Poor; Food Aid
required in 1990/91



FEWS, October 1990

Map 8: Sudan Reference Map

SUDAN

Food Insecurity Potentially Worse Than in 1984 Famine

USAID and FEWS/Sudan Report Received in Washington September 25, 1990

Summary

The 1990/91 agricultural season in Sudan is being compared to 1984, the year of the most devastating drought and famine of recent times. However, the effects could be far worse because in 1984 people had greater personal resources with which to cope with the problem. Household and personal resources in 1990/91 are totally depleted following the poor 1989/90 harvest. The traditional and mechanized sectors are anticipating very poor harvests. Large and rapidly increasing numbers of displaced and drought affected people throughout Sudan currently require food assistance.

People requiring relief food in North Sudan (see Map 8) include traditional farmers, pastoralists, urban displaced, and the urban poor. In the South, urban and rural displaced persons, farmers, and pastoralists need assistance. Relief needs in addition to cereals include supplementary foods, pulses, vegetable oil, vitamins, medicines, shelter materials, seeds and tools. The Government of Sudan (GOS) has neither the grain reserves nor other resources with which to meet the evolving needs. Public, private, and relief stocks are extremely low, providing no buffer against the anticipated large-scale deficit harvest. USAID is the only donor with currently allocable relief stocks in-country. Relief assistance will have to be carried out entirely by international donors.

Factors Affecting Food Availability

Agricultural Conditions

The amount and distribution of rainfall in 1990 has been very poor throughout Sudan. Rains started fifty to sixty days late in most areas. Cumulative rainfall has been about 50 percent or less than average, with few exceptions (see Table 1 below). Dry spells of 30 to 40 days in July, August and September caused drying of crops and serious damage. A similar pattern occurred throughout most of South Sudan.

Table 1: Cumulative Rainfall to September 22, 1990

SECTOR	STATION	CUM.	CUM. AVG. (1951-80)	PCT. AVG.
MECHANIZED	Sennar	174.9	444.0	39
	Gedaref	282.5	552.0	51
	Kosti ¹	193.7	338.0	57
	Damazine	577.5	650.0	89
IRRIGATED	Medani	63.4	324.0	20
	Kassala	67.4	288.0	23
TRADITIONAL	En Nahud	129.2	374.0	35
	El Fasher	99.9	249.0	40
	El Obeid	150.5	337.0	45
	Nyala	183.8	413.0	45
	El Geneina	391.3	499.0	78
AGRO-PASTORAL	Khartoum	2.9	151.0	2
	Port Sud'an	1.0	10.0	10
	Kadugli	461.5	579.0	80
	Babanusa ²	443.1	506.0	88
	Malakal	626.4	636.0	98

SOURCE: Sudan Meteorological Department, (SMD)

NOTES: ¹ Observations up to September 7th, 1990

² Observations up to September 17th, 1990

Most agricultural areas in both North and South Sudan reflect the season-long poor rainfall in their below average NDVI values (see Key Terms). Vegetation in Northern and Southern Kordofan and parts of central and western Darfur has started browning much earlier than normal.

The levels of the Blue Nile, Atbara, and Gash rivers have been consistently below normal this year, while the White

Nile has been slightly above normal. Reduced river levels in 1990 should not adversely affect major irrigation schemes, but will cause insufficient flooding for flood plain farming in some areas.

Stem borers could damage irrigated crops and negatively affect yield. Desert locusts are not a serious threat this year. Minor grasshopper infestations have been detected in Northern Darfur, but no significant damage has been reported. Birds could cause future problems, but the Plant Protection Department reports that control measures are underway.

Table 2 gives historical production figures for the major agricultural sectors of North Sudan (traditional, irrigated and mechanized). Figures for two previous poor years are presented as possible 1990/91 scenarios. Present conditions suggest that the 1990/91 harvest will be closer to the 1984 figures. Wheat production in 1990/91 could be as much as last year due to greatly increased area under cultivation so a higher figure was used in both scenarios.

Rainfall has been so sparse and late in many traditional agricultural areas that some farmers have not planted at all.

Table 2: North Sudan Cereal Production ('000 mt)

SECTOR	1984 Scenario	1987 Scenario	AVG. 1985-89
Traditional Sorghum/Millet	419	301	692
Irrigated Sorghum/Millet	446	356	469
Irrigated Wheat (1989)	409	409	239
Mechanized Sorghum/Millet	390	862	1,965
TOTAL	1,664	1,928	3,365

SOURCE: Ministry of Agriculture, Situation and Outlook Reports

Farmers planted in only one of thirty-four villages in Showak, eastern Sudan. Where crops have been sown, they have either dried up or are now stunted and dying. A Save the Children Fund (SCF/US) survey found only 15 percent of the planted area had flowering or preflowering plants in Um Ruwaba District of Northern Kordofan. Farmers and local officials expect cereal and cash crops to be a total failure in Soderi and Bara districts of Northern Kordofan. Partial or complete crop failure is also expected throughout Northern Darfur. Repeated plantings have failed and minimal production is expected in areas of northeastern Bahr El Ghazal of South Sudan. The very limited usable farmland in Juba is expected to produce only a mediocre harvest.

Large portions of land in Gezira, the largest irrigation scheme, was taken out of cotton and planted in sorghum. USAID estimates potential national sorghum production at 450-475,000 metric tons (mt), assuming a similar planting pattern in other schemes, which is close to average. However,

the bulk of this production will go to local consumption needs with a minimum available for use elsewhere.

The GOS planned to increase this year's area planted in irrigated wheat to 1.045 million feddans (one feddan equals 0.42 hectares) which would be 70% over the area cultivated in 1989. Over 660,000 feddans of wheat will be planted in Gezira and Rahad alone. This increased area could allow national wheat production to exceed last year's ten-year record of 409,000 mt. However, a continuation of the current heatwave would significantly reduce yields. Lack of rainfall has also placed more pressure on limited water for irrigation, which could further lower yields.

The GOS had planned to increase the area planted in mechanized sorghum to 12 million feddans which would have been 59% over the average. Poor rains, fuel shortages and insecurity in the mechanized areas of Southern Kordofan have reduced the area under cultivation, delayed planting and will considerably reduce yields. In Southern Kordofan, CARE reports that only 10% of the planned area (58,500 feddans) has been planted, in large part because of local civil strife and insecurity. Mechanized areas around Gedaref, which comprise about 50% of the total mechanized sorghum area, have had approximately 50% of normal rainfall. Of the 2.7 million feddans planted in Gedaref (compared to 3.95 million last year) only 2 million are expected to produce, and these were planted late, so poor yields are expected. Current conditions are similar to those of 1984/85 in which Gedaref produced 195,000 mt, compared to 1.2 million mt in 1988/89. Approximately 30% of prepared land in Kassala Province has crops that are patchy and stunted.

Pastoral Conditions

Climatic conditions in 1990 have been poor in all grazing areas, with late, badly distributed, and inadequate rains. Livestock losses of 50% are being reported in some areas of Northern Kordofan. Herders in eastern Gezira are trucking livestock to Kosti at great expense because the animals are too weak to walk, and high losses are being reported.

Food Stocks and Flows

Cereal stocks in Sudan are dangerously low. Agricultural Bank of Sudan (ABS) stocks are about 89,000 mt compared to 367,580 mt at the same time last year. These stocks are already committed and perhaps half is unfit for human consumption. Relief and Rehabilitation Commission (RRC) relief stocks totalled 4,085 mt as of August 30, most of which is in the South. National wheat and wheat flour stocks were 17,000 mt as of August 31, which is estimated by the GOS to cover only 21 percent of current needs. Commercial sorghum stocks are very low. The GOS is taking inventory of commercial stocks. An estimated 150,000 mt have been identified. Most household stocks are also depleted.

The major food aid effort in Sudan has been Operation Lifeline Sudan II (OLS II) in which about 104,000 mt of aid was imported in 1989/90 from various donors (approximately half from USAID). USAID is the only donor in Sudan with stocks remaining in-country. Currently USAID has 28,915 mt of sorghum and 2,091 mt lentils. However, anticipated 1990 allocations total 19,800 mt and do not include drought relief. USAID is owed 9,700 mt in loan repayments, but it is unlikely that these will be repaid by the end of 1990. Food aid totalling 47,700 mt requested from the United States by USAID/Khartoum has been approved. Other donor food requests are currently unknown.

Food imports through the end of 1990 are anticipated at 551,000 mt, including wheat, wheat flour, and food from swaps and grants. Exports are a very sensitive issue. There has been a ban on new export licenses since mid-1989. Official 1990 sorghum exports, honoring pre-existing commitments, total 130,700 mt. Unofficial exports and illegal cross-border trade may considerably exceed this figure.

Factors Affecting Food Access

Urban and rural people face serious food access problems. There is virtually no grain in Khartoum markets and in other large towns and many small villages. Available grain is too expensive for all but the wealthiest people. The price of one sack of grain is currently equal to 150 percent of the monthly salary of a mid-level government officer, according to CARE. One sack of grain is about enough for a family of six for one month.

Food access is also a problem in the South. Large numbers of displaced persons in camps and urban areas depend entirely on the continued effectiveness of relief deliveries. Transport of relief and commercial food to the South is hindered by civil strife, government transport restrictions, fuel scarcity, and often impassible roads. For example, a train loaded with 1,500 mt of relief food for the South has been awaiting travel clearance for over one year. Virtually all relief food for the South is now delivered by expensive airlift operations.

Normal coping strategies have failed this year. Livestock sales are poor and cash crops cannot be grown because of the poor agroclimatic conditions. Firewood and charcoal sources are greatly diminished and sales are limited. Employment opportunities in the mechanized and irrigated sectors are limited because of reduced production. Existing wage rates are low. There are reports of men returning to their villages after unsuccessful attempts at seeking agricultural employment. Personal and household possessions, including gold, are being sold by many families.

Table 3: Cereal Balance Scenario (in mt, except population)

SCENARIO	NORTH SUDAN	SOUTH SUDAN
1990/91 POPULATION	19,955,000	5,731,000
1990/91 CONSUMPTION	2,893,400	573,100
+ CARRYOVER(1990)	89,000	0
+ PRIVATE (1990)	150,000	----
+ RELIEF (1990)	40,000	78,000
+ IMPORTS (1990)	598,000	----
+ PRODUCTION (1984)	1,331,200	119,000
- EXPORTS (1990)	130,000	----
= 1990/91 BALANCE	-815,200	-376,100
THEORETIC 1990/91 BALANCE	-1,191,300	

SOURCE: FEWS/Sudan using various sources

NOTES: Grain consumption rates are assumed to be 145 and 100 kilograms per person per year in the North and South, respectively. Southerners are primarily pastoralists and substitute a great deal of meat, dairy, and vegetables for grain, so that actual grain needs may be lower. Consumption figures do not account for subgroup variations. Population figures are based upon projections from the 1983 census. Wheat production reflects 1989 figures (see text for explanation). Net production assumes various losses that total 20% of gross.

Entire families are reported to have left their villages for urban areas such as Omdurman, in the greater Khartoum area. One village council in Kordofan reported 700 people leaving each week, and another 5,000 recently left central Kordofan. Tens of thousands are preparing to leave, waiting to see if relief will arrive to prevent their departure. An estimated 35,000 people not even attempting a harvest are reported to have arrived in Khartoum in the last two months. Other urban areas are also receiving many new arrivals. The El Obeid Town Council expects 100,000 new displaced in the near future. In Northern Darfur emigration is expected from Um Keddada, Malha, Mellit, and Fasher districts.

Projected Food Consumption Needs

Table 3 above estimates a 1990/91 national cereal deficit of 1,191,300 mt, assuming 1990/91 production similar to 1984. This table reflects a cereal balance sheet approach and only indicates magnitudes of food insecurity. It does not accurately represent needs in times of stress when eating patterns and diets shift, intake is reduced, and alternate foods are consumed. The FAO estimates that a national cereal deficit of one million tons would necessitate 300,000 mt of donated relief, with the remaining needs to be met by commercial and concessional imports. Sudan's maximum infrastructural

capacity for relief food is approximated at 300,000 mt by the World Food Program (WFP), and USAID concurs with this figure.

Economic Data

Exorbitant grain prices are being caused by cereal scarcities, poor current harvest prospects, merchant hoarding, and unusually high transportation costs. Prices normally decline in December and remain low until they rise moderately in July and August before the new harvest. Since December 1989, prices have continued to increase steeply partly due to the poor 1989/90 harvest. Sorghum prices in the North have reached 1200 to 2000 Sudanese Pounds (LS) for a 90 kilogram (kg) bag, compared to LS 100 to 200 at the same time last year and LS 600 just two months ago. In some places in the South prices have reached LS 4500 per 90 kg bag. Grain prices in El Obeid have increased about 95 percent between June and August, and August prices in Gedaref rose an average of 30 percent per week.

Extremely depressed livestock prices have been reported due to poor pasture conditions, water shortages, poor animal health, and high sales volumes. In many cases sellers cannot find buyers for their animals. Male goat prices have fallen to LS 40-60 from LS 250-300 this time last year. Camel prices have dropped to LS 3,000 from LS 21,000 in one area of Northern Kordofan.

The livestock-to-grain terms of trade are worse now than during the 1984 famine. One goat will normally bring two or more 90 kg sacks of grain (i.e., more than 180 kgs) in years with good harvests. In 1984 one goat brought about 6 kgs of grain. In 1990 one goat brings from 3 to 6 kgs of grain in some rural areas, enough for a family of six for about two or three days.

Update on Extremely Vulnerable "At-Risk" Populations

Large portions of the Sudanese population are presently "at-risk" (see Key Terms) of famine. "At-risk" populations include herders in the Red Sea and Northern Kordofan provinces, and possibly in Southern Kordofan and Darfur Region; traditional farmers throughout western, central, and eastern Sudan; and farmers in some areas of the South such as northeastern Bahr El Ghazal. Farm laborers in central and eastern Sudan are highly vulnerable due to depressed employment prospects and could be "at-risk" by late 1990. Urban residents are increasingly vulnerable because of low grain supplies and high prices, and the poorer urban residents could be "at-risk" very soon. Most displaced and refugee groups are highly vulnerable, and in some locations are "at-risk" due to relief delivery problems. Overtaxed relief capabilities will significantly increase the number of people designated "at-

risk", particularly with the expected increases in displaced populations due to drought.

Donors have not yet calculated the total number of affected and "at-risk" people. However, an indication of the magnitude involved is suggested by the following figures. There would be a total of 9.4 million affected people in Sudan assuming that the 1990/91 harvest approximates 1984 levels. There are already an estimated 4.5 million war displaced people and almost 1 million refugees in Sudan. People displaced by drought and the urban poor add considerably to this figure. A Non-Governmental Organization (NGO) calculates that Northern Kordofan Province alone could have 2.5 million affected people by August 1991.

Conclusions

The 1990 harvest will not meet the annual food needs of Sudan in 1990/91. A cereal balance deficit of more than one million tons is possible. Parts of central and eastern Sudan may produce enough to satisfy needs for some months into 1991, but western and southern Sudan production is unlikely to be sufficient to carry local populations to the end of 1990. The continuing needs of a huge displaced and refugee population, compounded by the certainty of large numbers of drought victims in 1990 will necessitate donor assistance for the remainder of 1990 and throughout 1991. Substantial assistance will also be needed in 1992, unless displaced persons are resettled, harvests and pastures improve over the previous two bad years, and people are able to resume their productive activities.

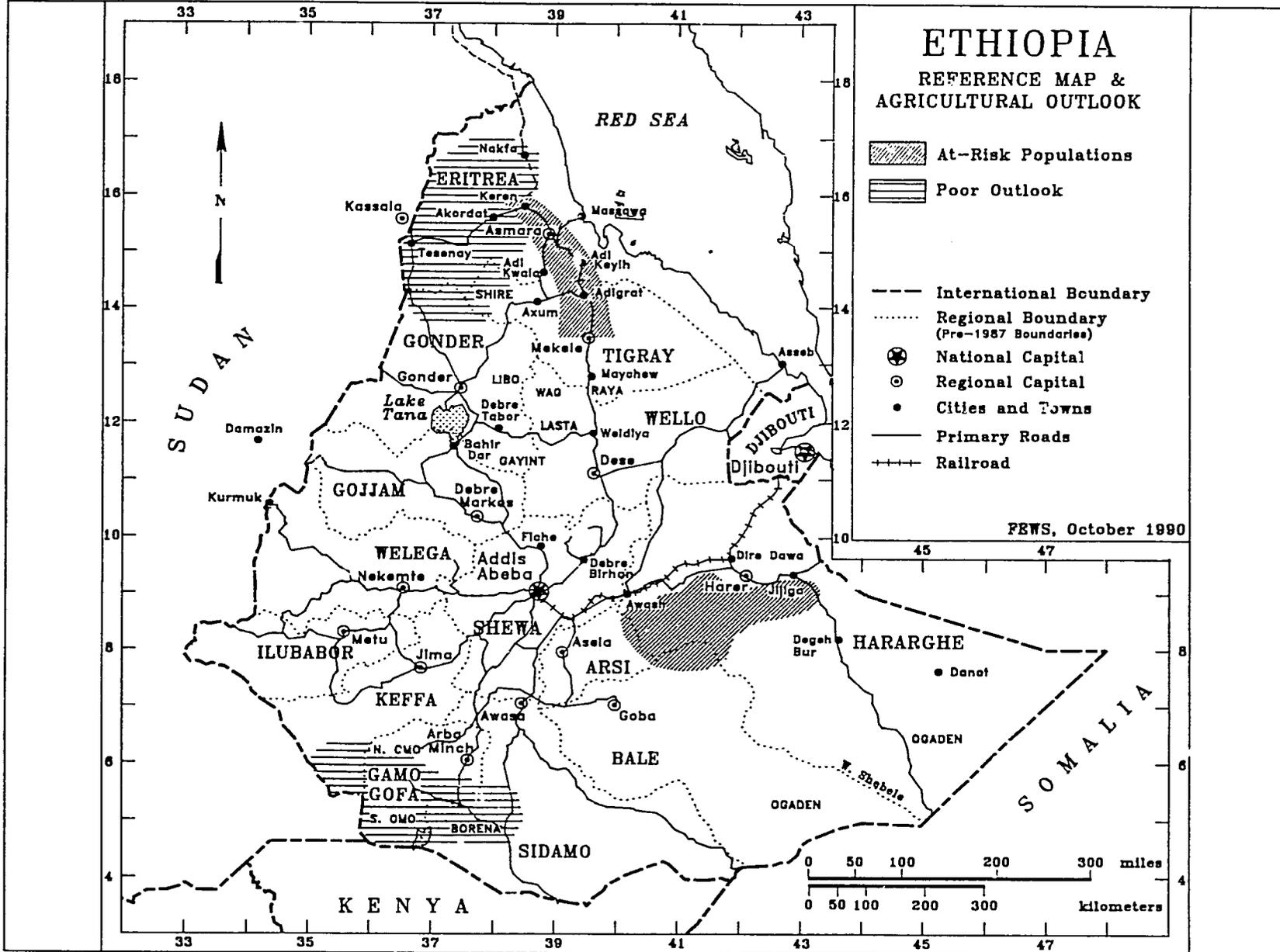
Local grain is unavailable to meet needs, thus all relief commodities will have to be imported. Foods other than cereals, such as pulses, vegetable oil, and vitamins will also have to be provided in order to maintain health. Other than food, important relief needs for 1990/91 include medical attention, water, and shelter building materials for displaced persons and refugees in camps and urban areas. Displaced persons in rural areas, and those returning to rural areas, will require seeds and tools while pastoralists require continued vaccination programs for their livestock. Drought victims will also need seed for the 1991/92 agricultural season.

To follow the evolving situation several indicators require continued monitoring. Most important of these are pasture and crop conditions, agricultural production, livestock health, cereal and livestock prices, market flows, movements of people, off-farm income, agricultural labor needs and wages, government and donor food stocks, cereal imports and exports, numbers of displaced persons and refugees, and health.

Appendix A: Vulnerable Groups in Sudan for 1990

Group	Subgroup	Subgroup Population	Location	Percentage Vulnerable	Base Vulnerable	Current Vulnerable	Current Relief
DISPLACED		1,800,000	Khartoum	75	Low	Low	No
			Khartoum	20	Moderate	Moderate	No
			Khartoum	5	High	High	Yes
	Transition Zone	350,000	S. Darfur	90	High	High	Yes
			S. Darfur	10	Moderate	Moderate	No
			S. Kordofan	90	High	High	Yes
			S. Kordofan	10	Moderate	Moderate	No
	South	2,350,000	Equatoria	80	High	High	Yes
			Equatoria	20	Moderate	Moderate	No
			Bahr El Ghazal	75	High	At-Risk	Yes
		Bar El Ghazal	25	Moderate	High	No	
		Upper Nile	65	High	High	Yes	
		Upper Nile	35	Moderate	Moderate	No	
REFUGEES	Settled	<556,000	Kassala Prov East	100	Low	Moderate	No
	Camps	>186,000	Kassala Prov	100	Moderate	Moderate	Yes
		110,000	Darfur	100	Moderate	Moderate	Yes
	Urban	50,000	Khartoum	100	Low	Moderate	No
		21,000	Juba	100	Low	High	No
FARMERS	Traditional	1,267,000	North Darfur	100	Moderate	At-Risk	Yes
		1,633,700	South Darfur	100	Moderate	At-Risk	
		1,244,500	North Kordofan	100	Moderate	High	Yes
		909,600	South Kordofan	100	Moderate	High	
			Central/East	100	Moderate	At-Risk	
		South	100	Moderate	High		
	Mechanical	Several '000 Families	Central	100	Very Low	Moderate	No
			East	100	Very Low	Moderate	No
			West	75	Low	Moderate	No
		West	25	Low	Moderate	No	
Irrigated	200,000 Families	Central	100	Very Low	Very Low	No	
		East	100	Very Low	Very Low	No	
AGRO-PASTORALISTS		111,000	North Darfur	100	Moderate	High	No
		272,300	South Darfur	100	Moderate	High	No
		284,700	North Kordofan	100	Moderate	High	No
		248,800	South Kordofan	100	Moderate	High	No
			South	100	Moderate	High	No
PASTORALISTS AND NOMADS		111,000	North Darfur	100	Moderate	At-Risk	No
		90,800	South Darfur	100	Moderate	At-Risk	No
		284,700	North Kordofan	100	Moderate	At-Risk	No
		83,000	South Kordofan	100	Moderate	At-Risk	No
		474,200	Red Sea	100	Moderate	At-Risk	No
LANDLESS	Ag Labor		East	100	Low	High	No
	Ag. Labor		Central	100	Low	High	No
URBAN RESIDENTS	Poor			100	Moderate	High	No
	Laborers			100	Low	High	No
	Skilled			100	Very Low	Moderate	No
	South			60	Moderate	High	No

NOTES: Population estimates are projections from the 1983 census using regional growth rates. Subgroup populations are observed from estimates of the percent of provincial population within each group.



ETHIOPIA

North and East Again Problematic

FEWS/Ethiopia Report Prepared in Washington October 10, 1990

Summary

FEWS' initial assessment of weather and crop condition data suggest that very poor rains over much of the country, and disruption of agriculture due to civil conflict and changes in the agricultural-sector policy environment, will leave more than 3 million people "at-risk" (see Key Terms) of famine. A worst case analysis suggests as many as 5.7 million people could be "at-risk". Most of these will be found in the agricultural highlands of Eritrea and north-central Tigray (see Map 9). A developing national food crisis in Sudan will put current relief programs directed at Eritrea and Tigray in jeopardy. Severe immediate food shortages are also found at all altitudes on the southern-facing slopes of the Harerge highlands. Problems elsewhere are largely local ones. Emergency food assistance needs will likely be at least 615,000 metric tons (mt) over the next year. An FAO/GOE crop assessment mission in November will provide a more detailed basis for donor and Government of Ethiopia (GOE) actions, although almost all agree that current programs should continue and new pledges of assistance are required immediately.

Factors Affecting Food Availability

Agricultural Conditions

In most of the country, the *meher* (main) season rains began late and cumulative rainfall has therefore been generally less than average over the season. This pattern has had most impact on the more marginal agricultural and pastoral areas in the north, east and south. In the center and west, the late start was ameliorated by good later rains and there will not be a significant negative impact on the harvest. The present year could therefore be compared to 1987 or 1989 in which food production problems were regional, rather than national ones.

In Eritrea and northeastern Tigray, most farmers were unable to plant long-cycle crops due to late and erratic rains at the beginning of the season. The near-complete interruption of rainfall recorded in Asmara during the last twenty days of August, followed by meager amounts of rainfall in September

is likely to have severely reduced even the yields of short-cycle crops in much of Eritrea and in northeastern Tigray (north and south of Adigrat). Agricultural and pastoral areas in western Eritrea and along a line running from Tesenay through Akordat and Keren to Nakfa show vegetation levels well below average. NDVI (see Key Terms) analysis suggests that 1990 vegetative conditions were worse than in 1989 and perhaps even 1984 in highland agricultural areas. To the west of Adi Kwala and on the coastal slopes northeast of Asmara, vegetative conditions appear above normal and better than 1989.

The growing season in Tigray has been more complex. At mid-July, reports indicated rains were consistent in most areas after a late start, and planting was in full swing. Good crop and pasture conditions were reported around the region. Gaps in the rainfall later in the season appears to have led to crop failure in many central and eastern areas, especially on the slopes of the escarpment, but have been less problematic in the south. Although rainfall picked up again in September, earlier problems have probably already severely harmed harvest prospects.

The surplus production areas of Shire and Raya (Tigray) are reported to have suffered less-serious rain shortfalls in July and August. NDVI imagery as of September 30 indicates that vegetative conditions in Shire are worse than normal for the season to date. In Raya, west of Maychew, vegetative conditions appear better than average for the season and at least as good as during 1989.

Seasonal vegetative conditions also appear good to above average in the often problematic lowland and highland areas of north, western and central Wello (Wag and Lasta) and eastern Gonder (Libo and Gayint). The average to above average main season harvest prospects may help to make up for the poor *belg* (secondary) season harvest in these areas.

In Gonder, southern Wello, northern Shewa, and pockets of Gojjam, poor rainfall from May through early July resulted in delayed planting, crop stress and decreased area planted to maize and sorghum. Short-cycle crops were substituted where possible but their success will depend on sufficient and extended rainfall over the remainder of season. Unusually good levels of rainfall (200% of the mean) were reported in Dese during the first 20 days of September. This and satellite

imagery indicate that there will probably be enough moisture to satisfy most crop needs through to harvest in these areas. The impact of civil conflict (see below) may be more detrimental to agricultural production here than the weather.

In Hararghe, the bulk of the harvest problems will be felt at mid- and low-altitude areas of the southern-facing slopes of the highlands. Seriously deficient levels of precipitation in June, July and early August led to the failure of successive maize plantings and the poor development, and sometimes failure, of sorghum. Continued rainfall anomalies in early August combined with seed shortages to delay the planting of short-cycle crops. Although rainfall recovered somewhat in late August and returned to normal through most of September, sufficient and well distributed rainfall through October is necessary if surviving sorghum and short-cycle crops are to succeed at all. Highland vegetative conditions were average to slightly below average in all administrative divisions except Gursom, Habro and Jijiga, where they were as deficient as at the lower altitudes. Highland, middle and even lower elevations on the slopes facing north were noticeably above average for the season.

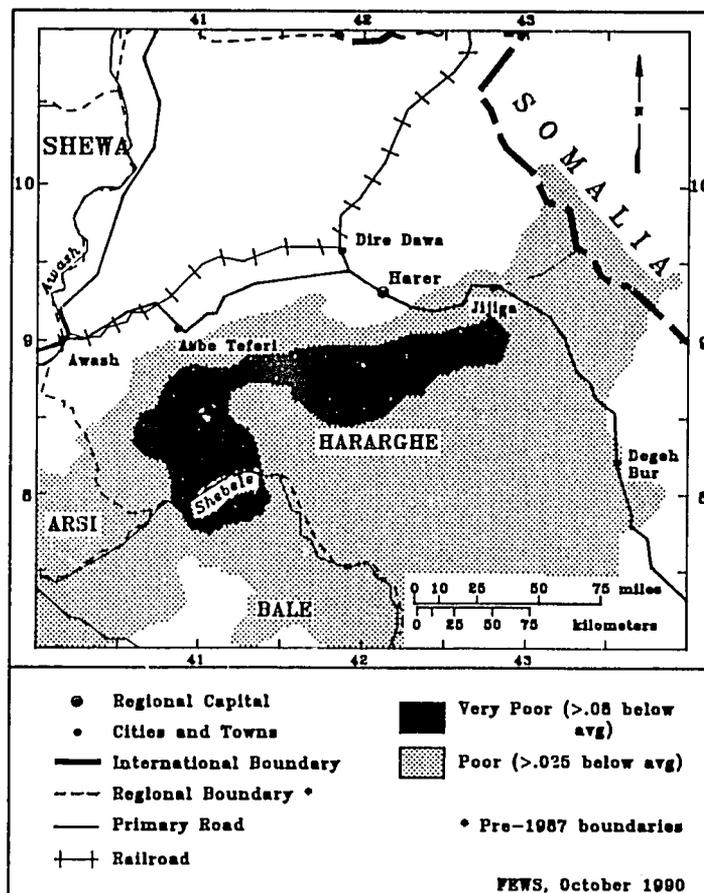
In most of the west, center, south-central and south-western agricultural areas of the country, late rains were made up quickly and the regular and generally sufficient rains since that time should allow crops to recover for normal yields. Problems are reported in North and South Omo where poor July rainfall caused considerable damage to teff and some damage to sorghum but root crop areas should be relatively less affected by rain levels. Satellite imagery shows vegetative conditions in most of North and South Omo to be below average for the season, especially in the lowland areas.

Civil strife is probably a greater cause of poor production than rainfall in parts of Wello, northern Shewa and Gonder this year. Large numbers of farmers are reported to have been unable to plant or to have left their farms due to the intensity of the fighting. Others have been conscripted to fight and are therefore unavailable for agricultural endeavors.

The GOE decided in March to do away with long-standing dictates concerning communal land tenure and the central control of agricultural production and marketing. It abolished grain production quotas and grain control stations, liberalized (privatized) the internal trade and marketing of grain, and allowed the dissolution of the producer cooperatives (PC). Producer cooperatives were dismantled by a vote of members in the vast majority of sites around the country. Land tenure conflicts, even armed battles, arose as a result, and caused disruption to *belg* and *mcher* season planting.

Although some of these problems have been resolved, many remain to be worked out. The question of who "owns" the debt obligations of the former communal group led, in some cases, to denial of new credit and other inputs. It will also take time for private interests to develop marketing

Map 10: Hararghe Season-to-date (July-September 30) Growing Conditions Compared to Average



SOURCE: FEWS. Measured in NDVI units. A difference of .08 is a loss of approximately 20-50% of the "greenness" normally found in these areas.

networks to support the trading of agricultural and other products. It is impossible to say for sure what will be the eventual effects of these reforms on agricultural production, but most expect they will be positive in the long-run, with a certain cost in production during the short-run.

In the trypanosomiasis-plagued areas of Wellega, Il-lubabor and west Shewa, agricultural production is again reported to be a problem, owing to the scarcity of draught oxen. This has severely limited the area planted and consequent harvest prospects.

Pastoral Conditions

Several pastoral areas will require close surveillance in the coming months due to poor *belg* and main season rains. In Eritrea, satellite imagery suggests that southwest pastures are problematic, having been seriously hurt by the same dryness and high temperatures that destroyed much of eastern Sudan's agriculture. NDVI indicates these areas to date are worse than average and 1989, but considerably better than 1984.

In the Ogaden, poor rain in March led to fears that water and pasture will be depleted well before the next rains in mid-October. NDVI through the end of September confirms below average vegetative conditions in southwestern areas of the Ogaden, especially along the Wabe Shebele basin. Conditions in western Sidamo also appear below-average and related to the same poor main season rainfall that hurt agriculture in the Omos. Pastoral conditions elsewhere in the Ogaden, especially in the Danot area, do not appear at this point to be more problematic than usual.

Food Stocks and Flows

Non-aid food stocks are exhausted throughout Eritrea due to poor production in 1989 and prior years. In Tigray, except for a few traditional surplus-producing areas, where some food stocks may still exist after considerable buying by donors, the situation is much the same. In Harerghe, highland agricultural areas may retain some stocks but they are minimal and unlikely to cover most of the needs in the rest of Harerghe. Household and other stock levels are minimal in other parts of the country.

Major international relief efforts are underway in the North covering the food shortfalls from the 1989/90 harvest in those areas. 1989/90 deliveries of food assistance from Sudan were projected to reach 31,800 mt, 85,000 mt of which is local purchase, internal purchase or swap. Two thirds of this total had been delivered to Northern Ethiopia by the end of August. Food aid deliveries to Asmara via the Emergency Airlift were reported to be 12,579 metric tons as of September 27, 1990. Southern Line deliveries to Tigray and Northern Wello were estimated at 65,134 metric tons for the six month operation. At August 31, there were 7,000 metric tons in stores. The total stocks in port as of September 21 were approximately 120,000 metric tons, with an additional 40,000 metric tons at anchor or afloat. Efforts are under way internationally to keep food in the pipeline as there are certain to be significant food needs again next year. Under 5,000 mt [have been/are being] dispatched monthly from Djibouti to Dire Dawa by rail. The aid pipeline for Harerghe was reported at October 1 to be almost 28,000 mt in country or afloat, a total coverage for 615,000 persons for 3 months. Pledges under consideration of 9000 mt would extend this one month.

Traditional surplus areas in the western and central highlands are likely have an average to above average production year, but these surpluses are not likely to flow beyond Addis and other central/southern urban markets due to the uncertainty of new agricultural policies, the increased civil strife throughout the North, and increasing transportation and fuel shortages throughout the country.

Factors Affecting Food Access

Economic Data

As a result of the GOE restructuring of the agricultural sector, urban access to rural food production may change. Urban populations will no longer be guaranteed cheap food prices, although free trade and marketing of food in-country should eventually mean that grain surpluses will move toward the markets with the highest prices. The net impact on rural and urban populations is that food prices should rise in the short and medium-term. Only if the incentive of higher prices does indeed promote production and marketing of agricultural production, and if weather permits, should prices eventually find a stable level.

Consecutive poor years of agricultural production in Eritrea, Tigray and Harerghe have gradually exhausted coping resources and have marginalized certain populations. People have had to face recurrent drought by disposing of productive assets and therefore have less and less to draw on to meet their needs.

In Harerghe, the interruption of market activity in/near Somalia due to civil conflict in northern Somalia means pastoralists will have fewer markets for cattle sales, and will not be able to provide for other needs through barter and exchange. This situation compounds the problems stemming from a second consecutive poor harvest.

Update on Extremely Vulnerable "At-Risk" Populations

In June, more than 2.5 million people, especially highland agriculturalists, urban wage laborers, and displaced persons were judged to be immediately "at-risk", most of them in Eritrea and Tigray. Certainly the main season has not bettered the condition of any of these groups. The first official estimates of the number of persons affected by the poor 1990 growing season are expected from the Relief and Rehabilitation Commission (RRC) by the end of October.

Projected Food Consumption Needs

A harvest assessment will be conducted by an FAO/GOE assessment team in November and will provide a quantitative basis on which to compare estimated regional harvests with consumption needs. Until that time, a close look at seasonal weather and crop condition data, and previous regional estimates of numbers of people affected by food shortages, can suggest a range of what the 1990/91 estimates of emergency food needs and people at risk are likely to be.

On a national basis, the 1990 main season harvest is likely to be similar in size to the 7,200,000 mt produced in 1989.

Table 1: Risk and Emergency Needs Scenarios

Area	At-risk ('000 person-years)		Aid Required ('000 metric tons)	
	Low	High	Low	High
NORTH				
Eritrea	1,500	2,000	309.3	412.5
Tigray	1,000	2,000	206.2	412.5
Subtotal	2,500	4,000	515.6	824.9
CENTRAL				
North and South Wollo	50	300	10.3	61.9
Shewa	25	168	5.2	34.6
Gonder	25	123	5.2	25.4
Gojjam	10	61	2.1	12.5
Subtotal	110	652	22.7	134.4
EAST				
Harerghe/Dire Dawa (Agricultural)	150	474	30.9	97.6
Harerghe/Dire Dawa (Pastoral)	100	241	20.6	49.7
Ogaden/Borena	100	289	20.6	59.6
Subtotal	350	1,004	72.2	206.9
SOUTH/WEST				
Illubabor/Welega	10	38	2.1	7.7
North and South Omo	10	61	2.1	12.6
Subtotal	20	99	4.1	20.3
TOTAL	2,980	5,754	614.6	1,186.57

SOURCE: FEWS estimates based on USAID, GOE, and other data.
Assumptions: Ration at 565 grams/day, or 206 kg/year equivalent

That was an unexceptional harvest marked by severe regional shortages in the North and regional surpluses in the Center and West. Many of the same patterns are seen this

year. A significant difference from last year is Harerghe where immediate and substantial needs are judged to be present this year. Some indicate, however, that last year's problems were also serious but not adequately dealt with.

USAID judged the number of people at-risk of famine for 1989/90 to be approximately 2.5 million. Given some strong similarities in conditions this year, but also some new factors related to drought and conflict in other areas, FEWS would not expect to see any less than the equivalent of 3 million people needing immediate, year-long, and full-ration emergency food assistance. At a daily ration of 565 grams of cereals, pulses and oil per day, the food required would equal approximately 615,000 mt over the next year, with some of the needs being immediate. Table 1 describes what the lower and upper ranges of food needs and people affected may be. UN agencies, with the support of many donors, are already asking that at least 100,000 mt be placed in the pipeline now for distribution in early 1991.

Each year Ethiopia falls further behind in producing the food it needs to maintain recent levels of food consumption. The "structural" deficit, or the gap between what is needed to meet status quo consumption requirements and what can be produced in a year when agroclimatological conditions are normal, is estimated by some to have grown to one million mt annually (in cereal equivalents). When weather patterns like those in 1990, 1984, or 1989 occur, an additional "acute" food deficit of up to 1,000,000 mt can bring the total status quo food requirement to nearly two million mt.

It is impossible, if not unnecessary, to program food relief against status quo requirements. It would be equally impractical, however, to ignore the longer-term implications for food security suggested in a status quo analysis. Recent agricultural policy changes are likely to restore some incentives for production, but much more will be necessary if the decreasing trend in annual per capita consumption is to be arrested or reversed.

Conclusions

For a second year in a row, the most marginal agricultural areas in Ethiopia have suffered a very poor main agricultural season due to drought and disruption. Emergency food needs for more than 3 million people will be at least 615,000 mt for 1990/91.

Key Terms

At Risk - FEWS Reports employ the term "at risk" to describe populations either currently, or in the near future, expected to have insufficient food, or resources to acquire food, to avert a nutritional crisis (i.e., progressive deterioration in health or nutritional condition below the status quo). "At risk" populations require specific intervention to avoid a life-threatening situation. Food needs estimates are sometimes included in FEWS reports. However, no direct relation exists between the numbers of persons deemed "at risk" and the quantity of food assistance needed. Famines are the culmination of a slow-onsetting process, which can be extremely complex. The food needs of specific "at risk" populations depends upon the point in this process when the problem is identified and the extent of its cumulative impact on the individuals concerned. The amount of food assistance required, from either internal or external sources, depends upon many considerations. Food need estimates periodically presented in FEWS reports *should not* be interpreted as food aid needs (e.g., as under PL-480 or other specific donor programs).

ITCZ - The Intertropical Convergence Zone (ITCZ) is equivalent to a meteorological equator; a region of general upward air motion and relatively low surface pressure bounded to the north and south by the northeast and southeast Trade Winds, respectively. The upward motion in the ITCZ forms the rising branch of the meridional Hadley Circulation. The ITCZ moves north and south following the apparent movement of the sun. It is at its most northerly position in the summer months. The position of the ITCZ normally defines the northern limits of possible precipitation in the Sahel; rainfall generally occurs 100 to 300 kilometers south of the ITCZ.

NDVI - Normalized Difference Vegetation Index (NDVI) images are created at the Laboratory of the National Aeronautic and Space Administration (NASA) Global Inventory Modeling and Monitoring System (GIMMS). The images are derived from Global Area Coverage (GAC) imagery (of approximately 7 kilometers resolution) received from the Advanced Very High Resolution Radiometer (AVHRR) sensors on board the National Oceanic and Atmospheric Administration (NOAA) Polar Orbiting series of satellites. The polar orbiter satellites remotely sense the entire Earth and its atmosphere once each day and once each night, collecting data in 5 spectral bands. Bands 1 and 2 sense reflected red and infra-red wavelengths respectively, and the remaining 3 bands sense emitted radiation in 3 different spectral bands. The NDVI images are created by calculation:

$$(\text{infrared} - \text{red}) / (\text{infrared} + \text{red})$$

for each pixel from the daytime satellite passes. Since chlorophyll reflects more in the infrared band than in the red band, higher NDVI values indicate the presence of more chlorophyll and, by inference, more live vegetation. A composite of daily NDVI images is created for each 10-day period, using the highest NDVI value for each pixel during that period. This technique minimizes the effects of clouds and other forms of atmospheric interference that tend to reduce NDVI values. NDVI is often referred to as a measure of "greenness" or "vegetative vigor." The NDVI images are used to monitor the response of vegetation to weather conditions.

METEOSAT - METEOSAT-based Rainfall Estimates. FEWS uses rainfall estimates based on cold cloud duration as measured by thermal infra-red radiometers on the METEOSAT satellite. The estimates are calculated by the Department of Meteorology at the University of Reading in the U.K. Cold cloud duration correlates well with thunderstorm generated rainfall and, thus, is suitable for use in the semi-arid Sahel. The method works best on level terrain; hilly areas may produce local enhancements or rain-shadow areas that are not detected. In level areas the method has an accuracy of "rain/no rain" of at least 85% (based on a comparison with ground data). At a dekadal (ten-day) scale, 80% of rainfall amounts under 60 millimeters (mm) are accurate to plus or minus 10 mm, while rainfall over 60 mm is accurate to plus or minus 20 mm. This accuracy is acceptable for use in the FEWS-monitored region given that the method provides near-real-time coverage for a large area at a resolution of less than 10 kilometers.