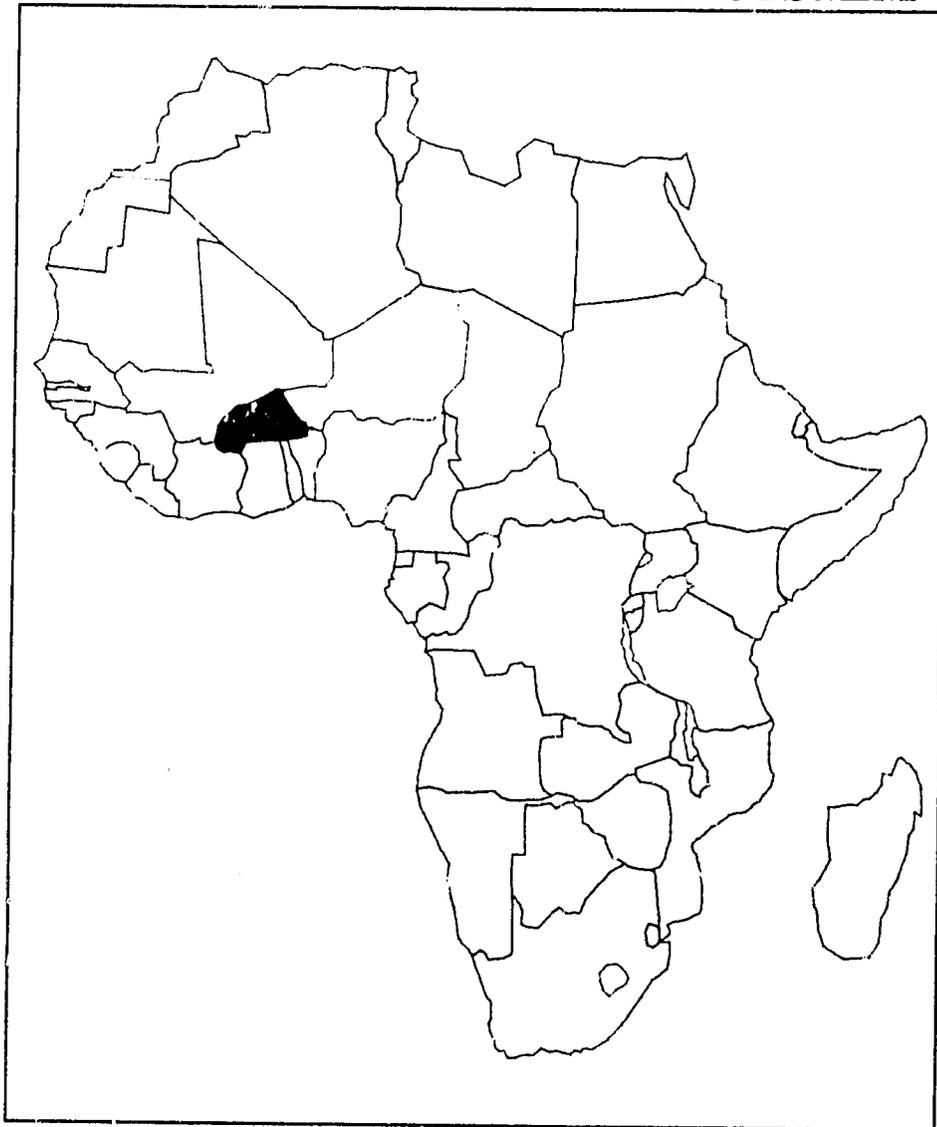


BURKINA

Floods Disrupt Supplies to Sahel

FAMINE EARLY WARNING SYSTEM



FAMINE EARLY WARNING SYSTEM

The Famine Early Warning System (FEWS) is an Agency-wide effort coordinated by the Africa Bureau of the U.S. Agency for International Development (USAID). Its mission is to assemble, analyze and report on the complex conditions which may lead to famine in any one of the following drought-prone countries in Africa:

- Burkina
- Chad
- Ethiopia
- Mali
- Mauritania
- Mozambique
- Niger
- Sudan

FEWS reflects the Africa Bureau's commitment to providing reliable and timely information to decision-makers within the Agency, within the eight countries, and among the broader donor community, so that they can take appropriate actions to avert a famine.

FEWS relies on information it obtains from a wide variety of sources including: USAID Missions, host governments, private voluntary organizations, international donor and relief agencies, and the remote sensing and academic communities. In addition, the FEWS system obtains information directly from FEWS Field Representatives currently assigned to six USAID Missions.

FEWS analyzes the information it collects, crosschecks and analyzes the data, and systematically disseminates its findings through the following publications:

- FEWS Country Reports - produced monthly during the growing season, and bimonthly during the rest of the year, and
- FEWS Bulletins - produced every ten days during the growing season.

In addition, FEWS serves the USAID staff by:

- preparing FEWS Alert Memoranda for distribution to top USAID decision-makers when dictated by fast-breaking events;
- preparing Special Reports, maps, briefings, analyses, etc. upon request; and
- responding to special inquiries.

FEWS Country Reports, Bulletins, Alert Memoranda, and other special studies are prepared for USAID's Africa Bureau by Price, Williams & Associates, Inc.

The work of the FEWS Field Representatives is coordinated by Tulane University's School of Public Health and Tropical Medicine.

NOTE: This publication is a working document and should not be construed as an official pronouncement of the U. S. Agency for International Development.

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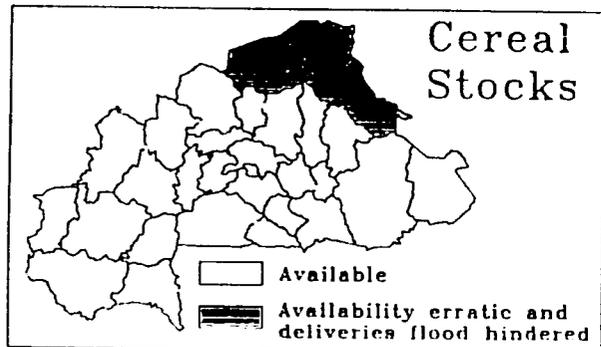
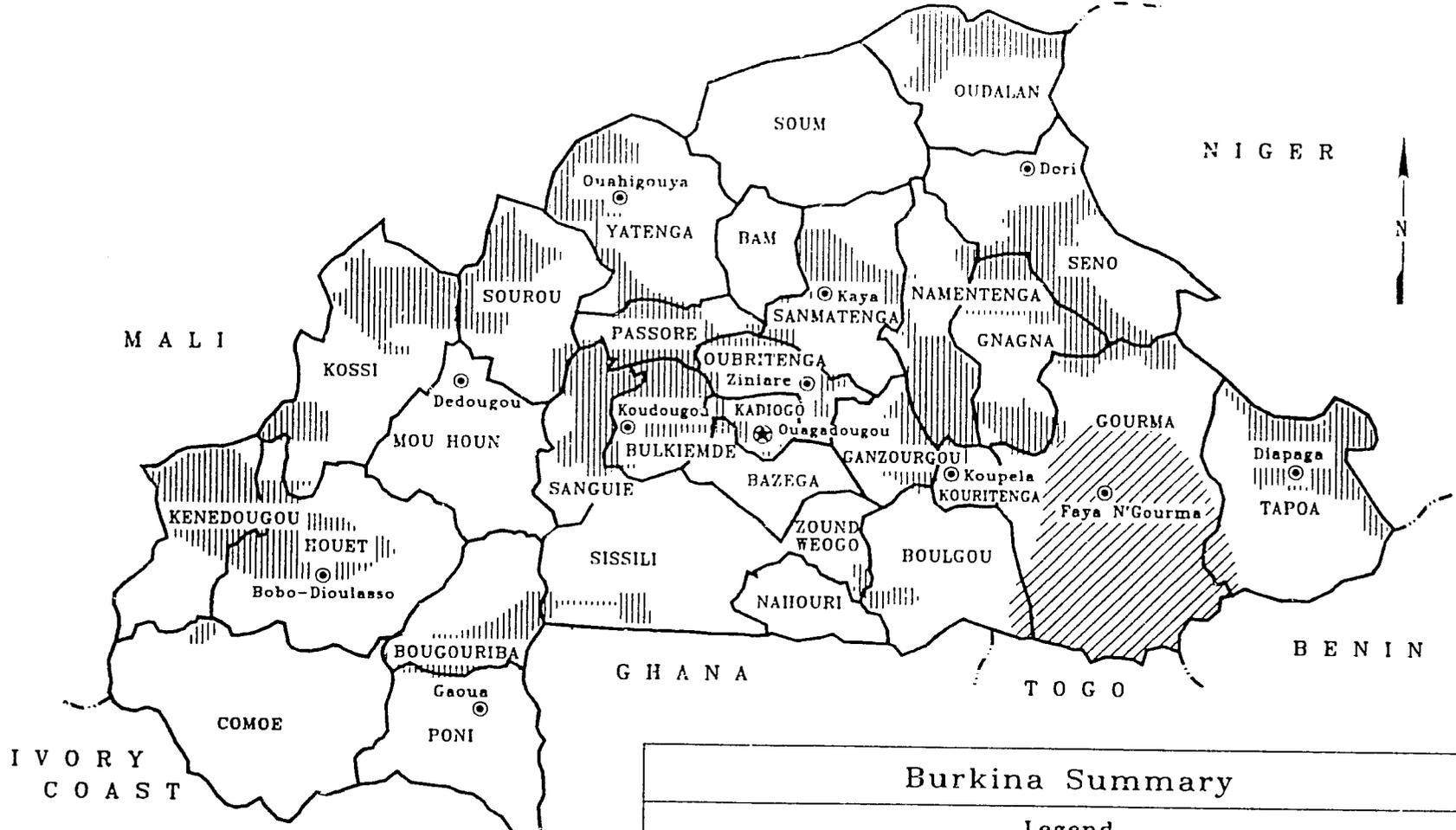
August 1988

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Burkina Summary

Legend

- ⊛ National capital
- ⊙ Regional capitals
- International boundaries
- National & regional boundaries
- ▨ NDVI levels greater than 1982-1987 maximum
- NDVI levels at or above the 1982-1987 average
- ▧ Rainfall 75% of normal

0 25 50 75 Miles
 0 50 100 Kilometers

Source: SAP FEWS/FFR
 FEWS/PWA, August 1988

Floods Disrupt Supplies to Sahel

Summary

Floods have disrupted emergency food deliveries in Soum, Oudalan and Seno provinces. Low to nonexistent on-farm stocks and erratic supplies of public cereal stocks currently plague the Sahelian provinces. These problems are compounded by the rains, which are disrupting overland transportation and hampering food distribution. Despite these problems, cereal availability, though somewhat precarious in the northern provinces, appears adequate. Pasture for livestock, particularly in the previously drought-stricken areas of the Sahelian provinces, is now good to excellent. Good pasturage should relieve stress on herds and the people dependent on them. The 1988 agricultural season promises to be very good throughout Burkina. The Ministry of Agriculture has reduced its estimate of 1987 agricultural production by 7%.

Floods in Burkina

The torrential rains have severed main routes to Dori, the provincial capital and primary distribution center for Seno and Oudalan provinces. Some 100 metric tons (MT) of emergency food are reported to have been airlifted to Oudalan and Soum provinces by helicopter and airplane. Reports also indicate that flood waters have damaged the Dori airstrip and, as a result, it has not been possible to resupply Dori with emergency food.

The Government of Burkina estimates that 10,000 people have been affected by floods, with over half of these left homeless. Two deaths in Kenedougou Province and four deaths in Soum Province have been attributed to the flooding. The northern provinces of Soum, Oudalan, and Seno, where public food stocks were already low, are among the areas most affected by the floods.

The Agricultural Season

The 1988 agricultural season in Burkina had a very favorable start, except in west central Burkina and in Gourma and Tapoa provinces. In west central Burkina, around Kéné Dougou, Houet, and Kossi provinces, rainfall began late. Plentiful rainfall during the last decade of July and the first decade in August, however, has improved the situation there. That area now has above-average cumulative rainfall as well as above-average vegetation levels (see explanation of NDVI on inside of back cover). Although rains began in early April, cumulative rainfall in Gourma and Tapoa provinces (southeastern Burkina) had been only 75% of the historical average through mid August. Despite this earlier rainfall deficit, satellite images of Gourma and Tapoa do not now indicate any evidence of stress. Since the NDVI average is based on only six years (during which time, rainfall was below the 30 year average), below "average" rainfall could produce greater than "average" vegetation index levels. Both Gourma

and Tapoa provinces are areas that have historically, as well as recently, enjoyed adequate or surplus production.

Overall, rain began earlier and has fallen in greater amounts this year than the long-term average. Barring unforeseen circumstances, these rains should lead to above-average agricultural production for the country. Overall NDVI levels are also considerably higher this year than the 1982-1987 average. Vegetation levels are particularly above average around the towns of Dori and Ouahigouya (located in northern Burkina). The above-average NDVI levels in the Sahelian regions of Burkina indicate good pastures in those areas, supplying needed relief to agro-pastoralists and their herds.

Cereal Availability

In spite of dramatic improvements in pasture and the generally promising outlook for the 1988 harvest, the northern provinces of Soum, Seno and Oudalan have only minimally adequate public stocks on hand and require additional emergency food. This situation is complicated by the disruption of overland transport due to rains. In particular, bridges and roads leading to Dori have been washed out. While worrisome, the food situation there does not suggest an emergency.

Cereal Prices

Cereal prices in the north fluctuated in response to the sale of cereals at below market prices (funded by West Germany). As soon as these stocks disappeared from the market, however, prices increased. The fact that grain prices have remained high suggests that private cereal stocks are low or that merchants are withholding their supplies from the market to maintain high prices. The Système d'Alerte Précoce (SAP) speculates that high cereal prices may be connected to the willingness and ability of returning miners to pay for cereals at those levels.

1987 Cereal Production

The Government of Burkina (GOB) has lowered its preliminary estimate of 1987 cereal production. The earlier estimate has been revised downward by 122,297 gross metric tons to 1,514,804. With this 7% reduction, per-capita production falls to 152 kilograms (kg). USAID/Ougadougou uses 192 kg per person per year to estimate the level of cereal required by the people of Burkina. Cereal production from 1987 is therefore estimated to fall 40 kg short of the requirement for each person. Stocks from previous years' production could make up the shortfall.

Reorganization of the Ministry of Health and Family Planning Programs

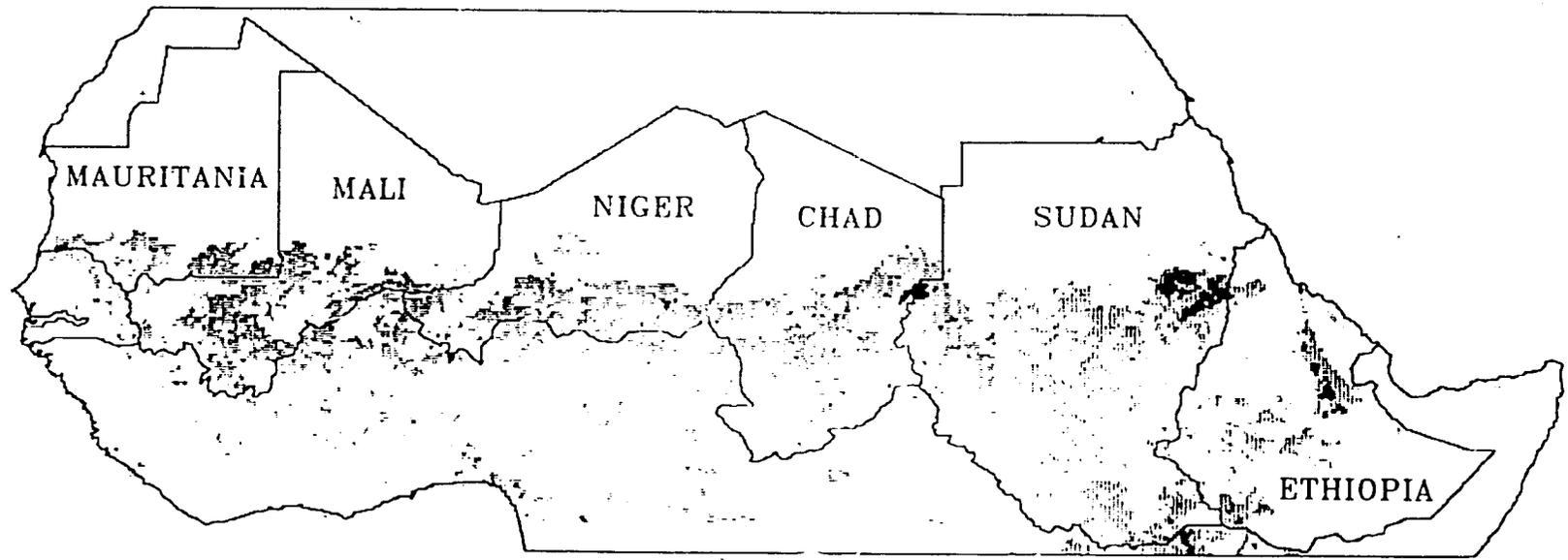
The official reorganization of Burkina's Ministry of Health and Family Planning Programs places the National Committee Against Drought (CNLES) officially under the Ministry of Health. CNLES had already been operating under the Ministry of Health for some time. This reorganization should not change the current position of SAP under CNLES.

Regional Weather and Vegetation

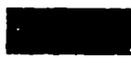
The Intertropical Convergence Zone (ITCZ) has been further north and has remained north longer than at any other time during the last ten years. The average ITCZ was hovering at about 21° N during the last ten days of August. Normally, the ITCZ is at 19° N during this period. As a consequence of the ITCZ holding such a northerly position, the rains have moved well north, creating good pastures farther north than in recent years (see Map 2). The unusually northerly position of the ITCZ is evident in the mid-August report of 64 millimeters (mm) of rain at Moudjeria (central Mauritania) -- an area which last year had only 6mm of rain and the year before had none.

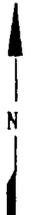
Much Stronger Vegetation than Historical Maximum

August 11-20, 1988 vs 1982-87 Maximum for Same Decade



 Stronger than historical maximum

 Much stronger than historical maximum



Source: NOAA/NASA GAC Imagery
FEWS/PWA, August 1988

For FEWS-monitored countries, cumulative rainfall for the first ten days of August showed a generally favorable pattern (see Map 3). Heavy rainfall in the western Sahel continued through the end of August (see Map 4). With these heavy rains, northwestern Senegal approached 100% of normal cumulative rainfall after experiencing a significant rain deficit through mid August. Two areas in the Sahel had also received less than 75% of normal rainfall at mid August: a crescent shaped area around Senegal's Cape Vert including the towns of Kaolack and Diourbel and an area in southern Gourma Province (south of Fada N'Gourma Town) in Burkina. The abundant to torrential rains during the final ten days of August has brought these areas close to 100% of cumulative rainfall for the season. The regional agricultural weather facility AGRHYMET indicates that cumulative rainfall levels in most of the Sahel outside of Mauritania and northern Senegal are now sufficient for short-season crops to last until harvest, even if the rains were to stop on September 1.

The persistent and abundant rains have brought flooding and loss of life and have destroyed homes and crops in Burkina, Niger, and Chad. Reports indicate that, among Sahelian countries, Chad has been the hardest hit by floods. Heavy and regular rains also continued through the end August in eastern Sudan (moving toward Khartoum), aggravating the floods there. There are reports of flooding in Sudan's Gezira and in other irrigated areas in Sudan. Rains have continued in Ethiopia as well, with much of the Nile watershed in Ethiopia receiving up to 100 mm of rain.

The Senegal River has been rising at Bakel, indicating a good flow of water from the Falémé and other Senegal River tributaries. The Niger River and its tributaries are also doing well to date. The Niger is doing particularly well in Niamey as a result of record-breaking flows from right-bank tributaries. Both the White Nile and Blue Nile rivers are higher than is normal at this time of year.

By mid August, satellite imagery showed substantial green-up extending as far north as 18° N in Mauritania, 17.4° N in eastern Chad, and 17.2° N in eastern Sudan. Some green-up is also apparent in Mali's Adrar and the Air Mountains of Niger. Areas in central Ethiopia that were previously of concern because of below-average vegetative conditions were covered by clouds in the most recently available images. A strong upsurge in NDVI now would not necessarily reflect a favorable outlook for this area's long growing season crops (sorghum and maize).

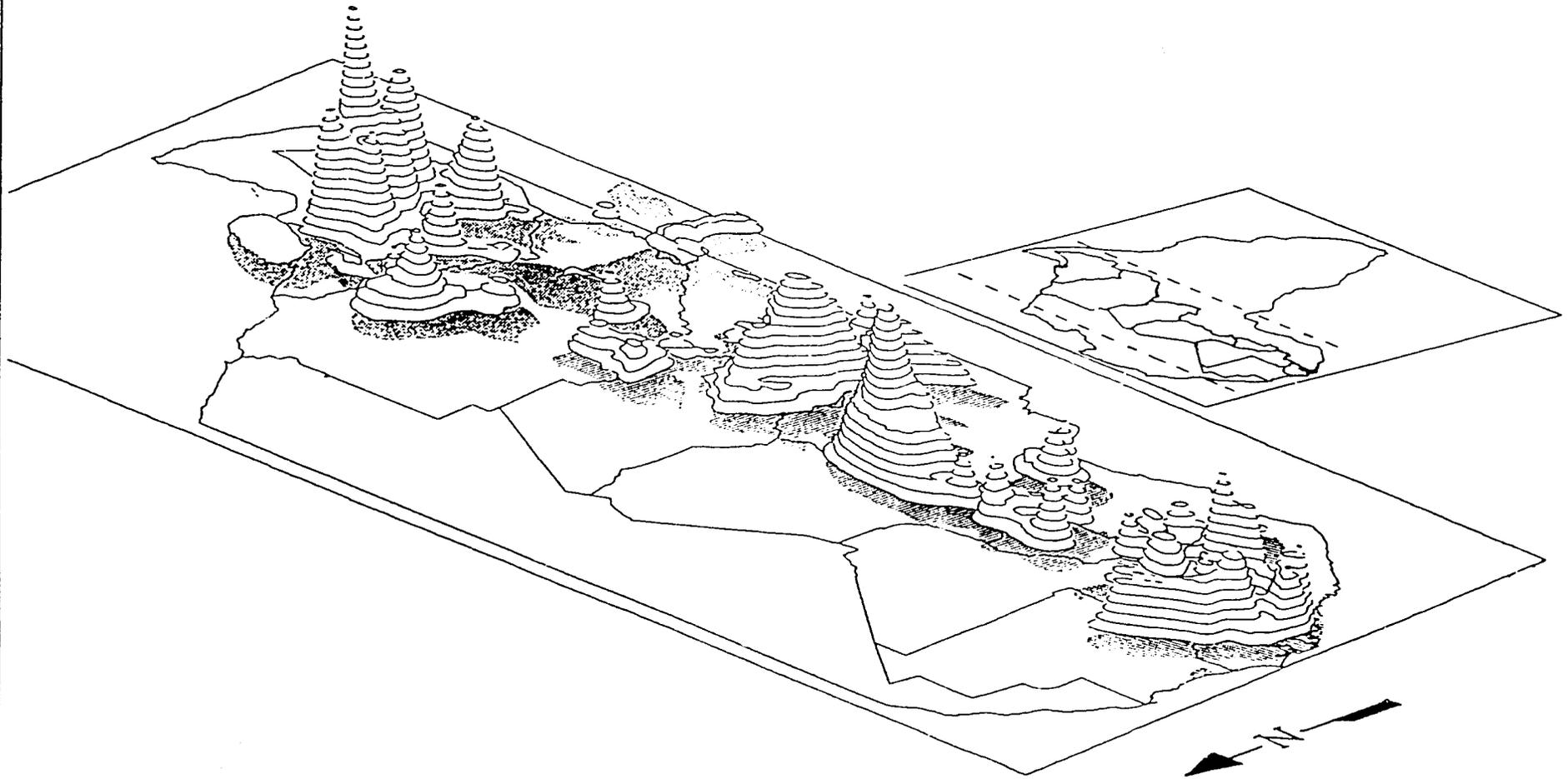
Satellite imagery for mid August confirms the impression that cumulative rainfall this year is considerably greater than in the past several years (see Map 2). Vegetation levels across the Sahel and in Sudan are much higher than the maximum levels for mid August during the last seven years. At the least, these elevated values would imply a great improvement in pasturage over previous years. In agricultural areas, the high NDVI values probably herald similarly high grain yields. Late July and August rains have raised NDVI levels above the historical maximum along the escarpment in Tigray and Wello regions of Ethiopia. Other areas of Ethiopia, particularly the Hararghe and Bale highlands, still display below-average vegetation levels.

Regional Desert Locust Summary

Large desert areas in all the Sahelian countries have been showing above-average vegetative conditions this summer, reinforcing the likelihood that Desert Locusts will find favorable conditions in most of their traditional winter breeding areas. An overall late start in the summer breeding cycle has limited the number of generations to two in most areas, instead of the three feared earlier. As a consequence of the rapid northward movement of the ITCZ and rains, the locusts have been pulled north, keeping them away from the most important grain-producing areas of the Sahel and limiting the amount of crop damage. Desert Locusts are now in greater numbers farther north (and in more remote areas) than has been usual over the past several years. This makes the job of crop protection services more difficult as locusts must be controlled over larger and less accessible areas. The most serious Desert Locust outbreaks (shown on Map 5) remain:

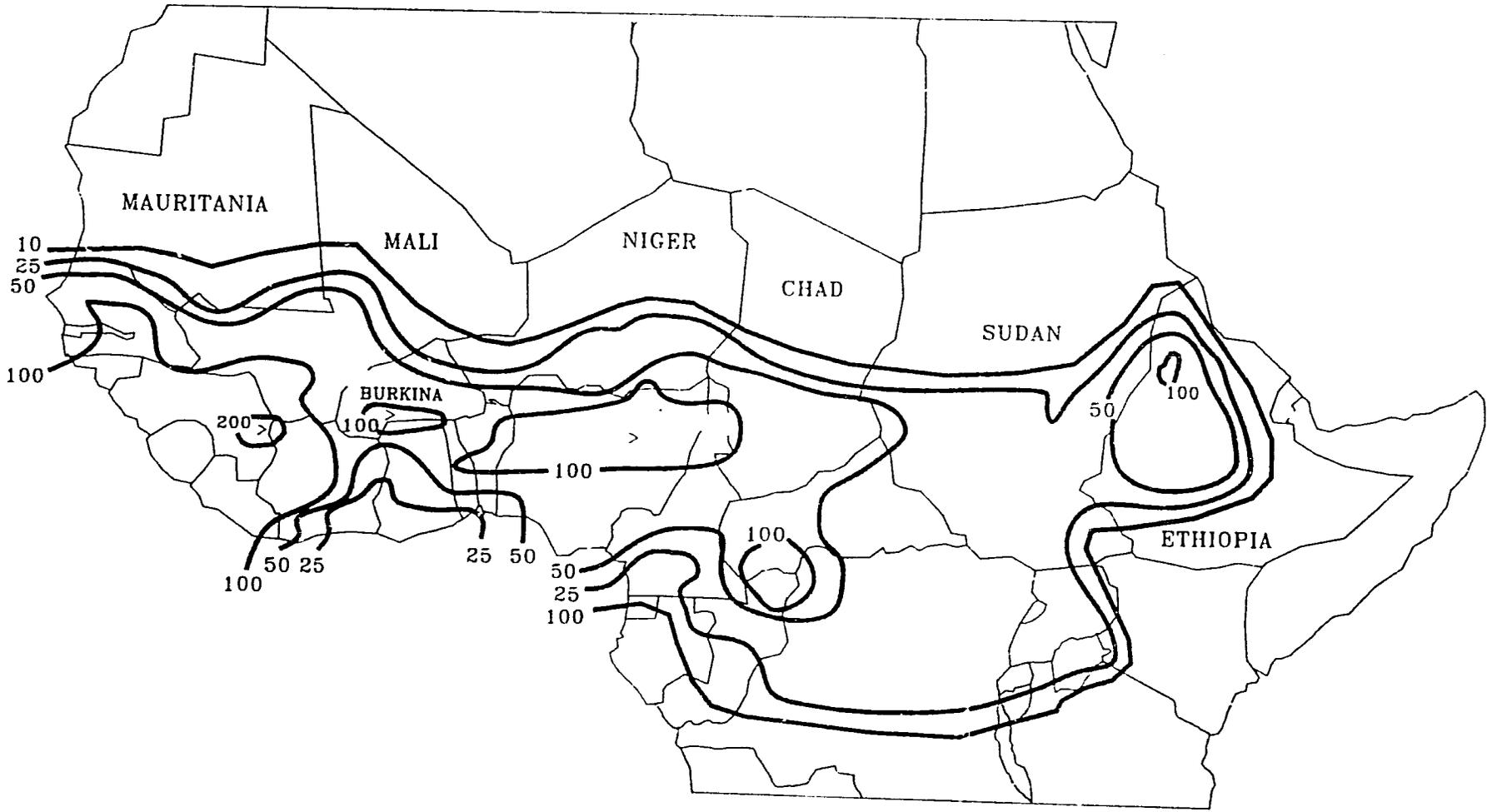
Early August Rainfall

Contour Interval Equals 5mm



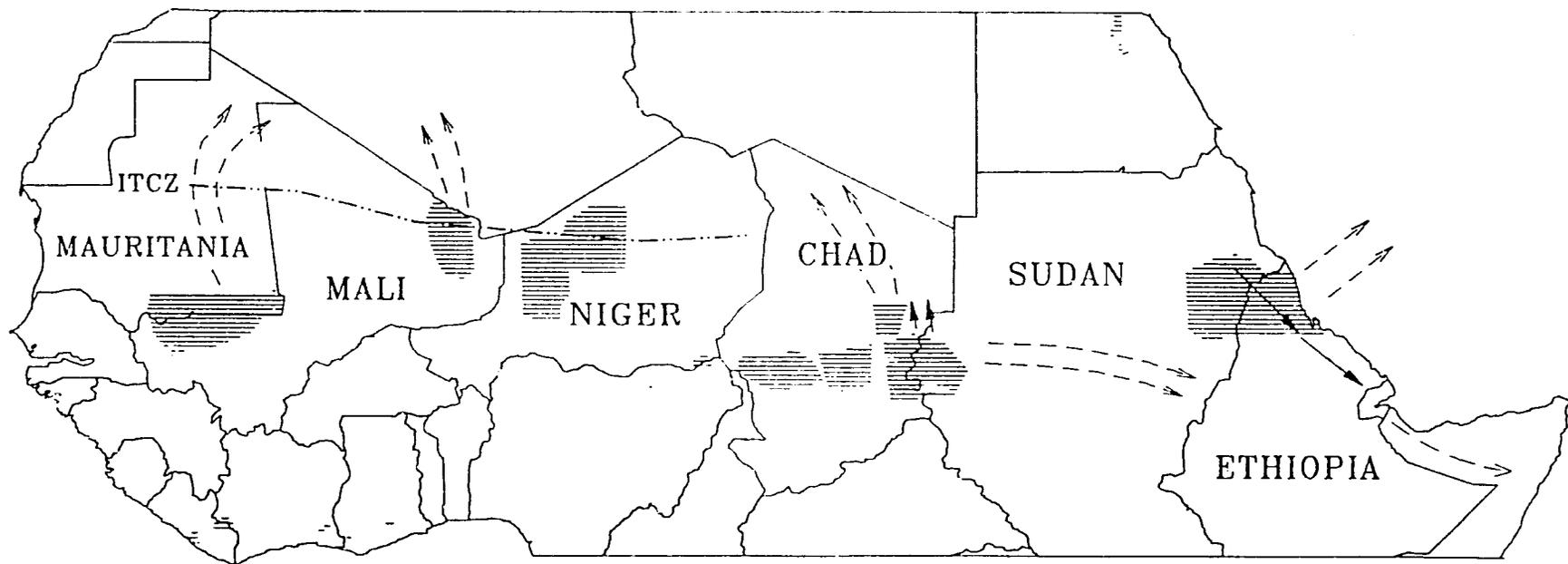
Rainfall

August 24-30, 1988



Source: JAWF assessments
FE VS/PWA, August 1988

Desert Locusts To August 30



-  Desert Locust sightings
-  Current movement of swarms and hopper bands
-  Possible future movement



SOURCE: Mission Cables; AID/OFDA/DLTF;
NOAA/NASA AVHRR GAC Imagery; NOAA
FEWS/PWA, August 1988

- in east-central Chad and bordering areas of Sudan, and
- west of Niger's Air Mountains.

Rains over Chad's initial infestation areas have been heavy enough to drive the locusts northward. The position of the ITCZ over eastern Chad and western Sudan will determine the direction in which the locusts will fly. If the ITCZ remains to the north, the accompanying winds will push the locusts to the north and west, into the desert and away from croplands. If the western end of the ITCZ swings south, the Desert Locusts will be funneled into generally advantageous winter breeding grounds in Ethiopia and Somalia. So far, Chad's Desert Locusts are known to be moving north from the country's eastern Sahel. The infestations in northern Niger are important both because of their size and because of their inaccessible location, making control of the area difficult.

Less serious, but still important, outbreak areas include:

- the border area between western Mali and southern Mauritania,
- the Adrar des Iforas in Mali,
- a long band across southern Niger,
- west-central Chad, and
- the border area between Kassala Province in Sudan and Eritrea Region in Ethiopia (these areas might become very important later in the season).

The southern Niger outbreak zone and the Mali-Mauritania area contain some recent vegetative growth and recently emerged larvae, but these areas are not considered as great a threat as the outbreak areas in Chad and western Sudan. In southern Niger, the swarms are broken and scattered, making imminent gregarious behavior unlikely; in Mali and Mauritania, the individual infestations are small (making control a bit easier than in other parts of the Sahel).

Recent rainfall in summer Desert Locust breeding areas on the Red Sea Coast has significantly improved breeding conditions. In the fall, Desert Locusts could pose a serious threat to both Sudanese and Ethiopian agriculture.

Key Terms

At Risk - FEWS Reports employ the term "at risk" to describe those populations or areas either currently or in the near future expected to be lacking sufficient food, or resources to acquire sufficient food, to avert a nutritional crisis (i.e., a progressive deterioration in their health or nutritional condition below the status quo), and who, as a result, require specific intervention to avoid a life-threatening situation.

Where possible, food needs estimates are included in the FEWS reports. It is important to understand, however, that no direct relation exists between numbers of persons at risk and the quantity of food assistance needed. This is because famines are the culmination of slow-onset disaster processes which can be complex in the extreme. The food needs of individual populations at risk depend upon when in the disaster process identification is made and the extent of its cumulative impact on the individuals concerned. Further, the amount of food assistance required, whether from internal or external sources, depends upon a host of considerations. Thus the food needs estimates presented periodically in FEWS reports *should not* be interpreted to mean food aid needs, e.g., as under PL480 or other donor programs.

ITCZ - The Intertropical Convergence Zone (ITCZ) is where the high pressure system originating in equatorial regions of the Atlantic (the St. Helena's High) collides with the Azores High descending from the north. The ITCZ tends to move northward during the spring and summer in response to normal global weather patterns. 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) approximately 4 km resolution images 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 calculating:

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

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.