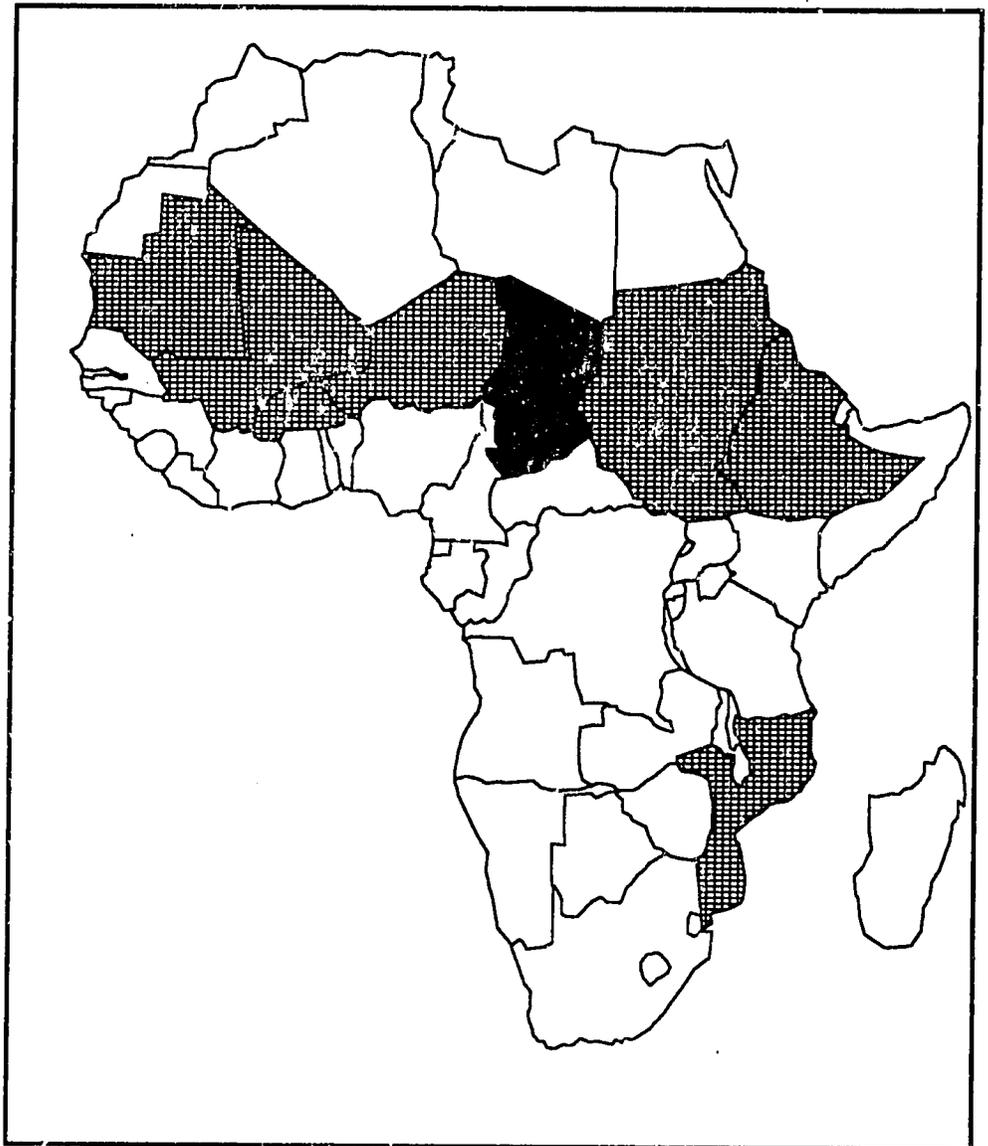


Report Number 5
October 1986

FEWS Country Report

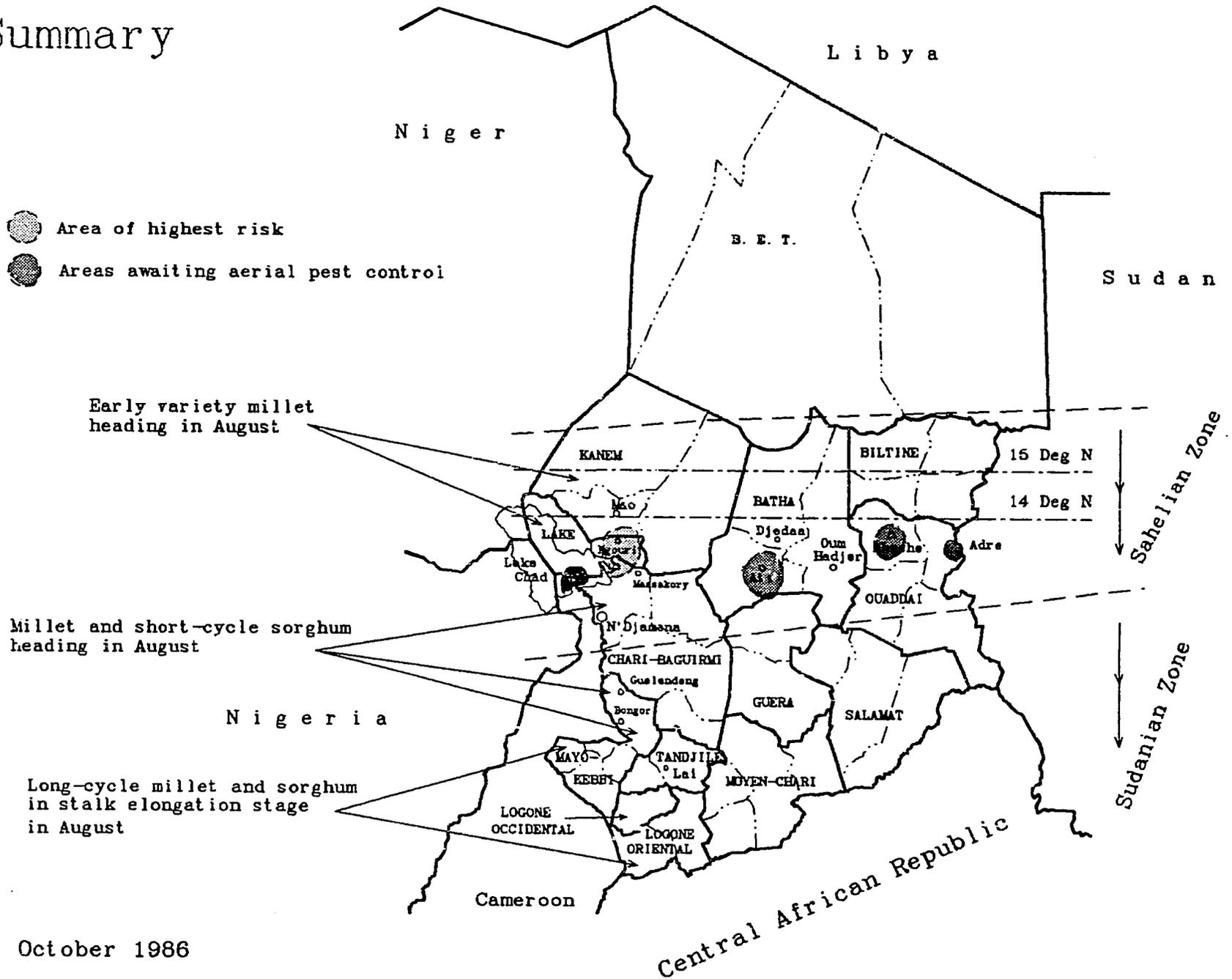
CHAD



Africa Bureau
U.S. Agency
for International
Development

Map 1
CHAD: Summary

-  Area of highest risk
-  Areas awaiting aerial pest control



CHAD

Harvest Prospects Good, Pockets of Stress

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

Prepared by
Price, Williams & Associates, Inc.
October 1986

Contents

Page

i	Introduction	
1	Summary	
1	Rainfall and Vegetation	
2	Map 2	
3	Pests	
4	Maps 3, 4, 5	
9	Agriculture	
10	Map 6	
12	Maps 7 & 8	
13	Graphs 1 & 2	
14	Food Flows/Needs	
14	Populations At-Risk	
16	Appendix I	
17	Appendix II	
20	Figure 1	
21	Figure 2	
	Inside Back Cover	Map 9

INTRODUCTION

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

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

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

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

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

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

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

SUMMARY

The harvest prospects for Chad look good this year. Satellite imagery for Chad shows most areas to be greener than the average for the previous five years. Rainfall has continued in most of the areas below 14 degrees north latitude (N), supporting the maturation of cereal crops. Crops north of 12N are still vulnerable to pest infestations, which could reduce yields dramatically in individual locations, depending on the timing and effectiveness of pest control programs. Isolated at-risk populations remain due to irregular, spotty rainfall (northern Biltine Prefecture), or a combination of lack of rain and presence of insect pests (eight villages in and near N'Gouri Sub-prefecture, Lake Prefecture, Map 2).

Issues

- o While the grasshopper/locust control program has begun in Lake, Kanem, and Chari-Baguirmi Prefectures (location of the villages named as at very high risk by AEDES (European Agency for Development and Health), a shortage of equipment, especially functioning fixed-wing aircraft, has delayed control efforts in the rest of the country.
- o At-risk populations in Lake, Kanem and Chari-Baguirmi Prefectures may need food-aid intervention. Pockets of agricultural stress along the northern boundary of the cropping zone, especially toward the east, will require further monitoring to determine whether an at-risk situation exists.

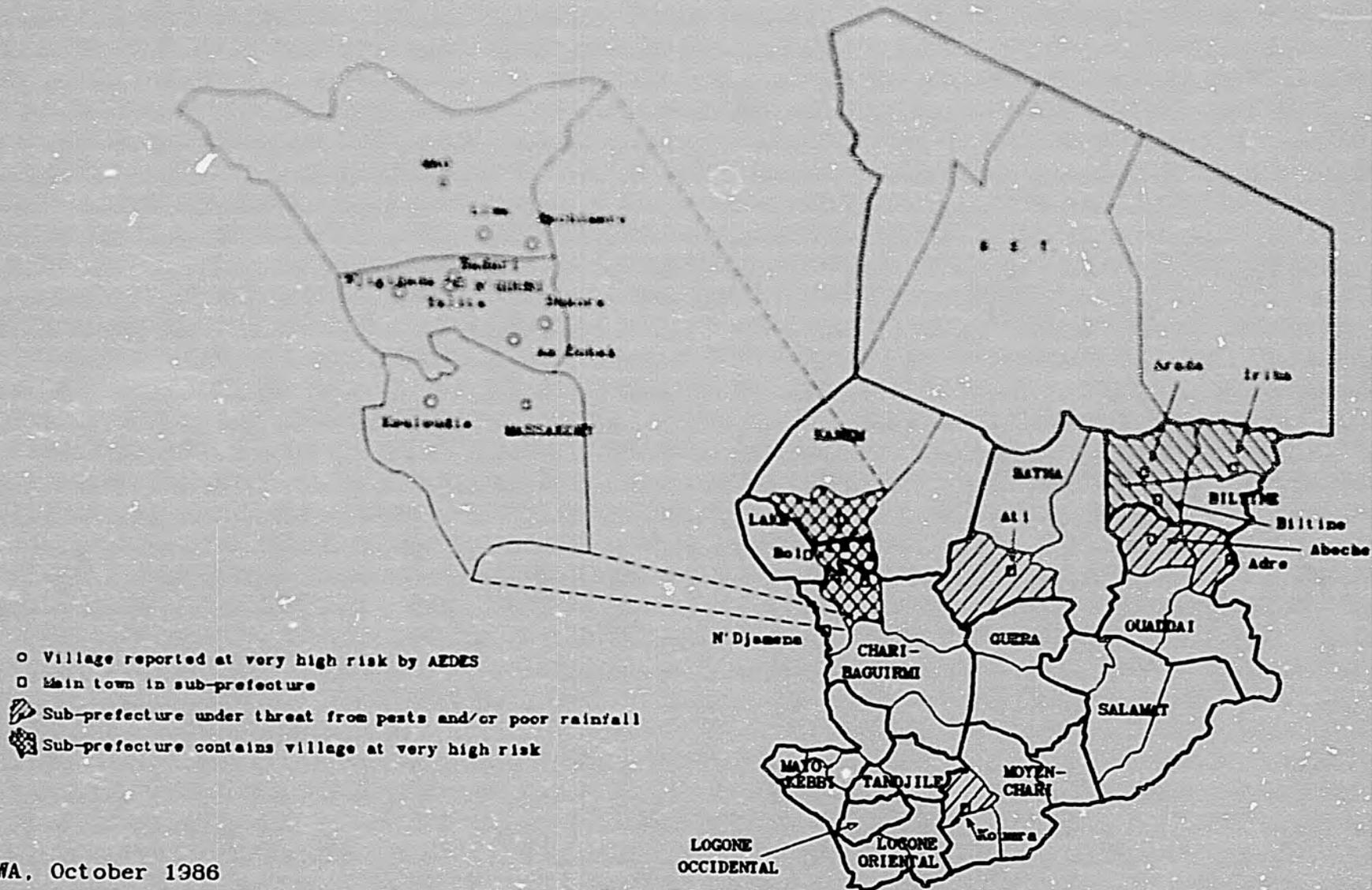
Key October Events

- o October is the month of grain harvests. The quantity and geographic distribution of the harvest of the various crops will determine any food deficit areas in Chad in the coming year.
- o The grasshopper control program should conclude from late October to mid-November as you move south from 14N. The conclusion of the current campaign would be the time to finish plans for monitoring and control programs during next year's growing season.

RAINFALL AND VEGETATION

Rainfall this year has been below the thirty-year average, but still has been adequate in quantity and timing to favor cereals production in most of the country below 15N. The water table has continued to rise throughout the country, especially at N'Djamena. Lake Chad began its annual flood in September, submerging adjacent polders. The main channel of the Logone River, Chad's second major river, flooded at Lai, Tandjile Prefecture, in September also. While steadily increasing, water levels are lower than at the same time last year.

Map 2
 CHAD Populations At-Risk



Map: FEWS/PWA, October 1986

2

The Inter-Tropical Discontinuity (ITD), predictor of the northern boundary of rainfall, moved briefly from its high point in July to about 16N in early August, then back up to 18N in mid-August. In mid-September, the ITD was significantly above its normal 17N position for that period. Since September 20 it has begun to move south rapidly, signaling the end of the rainy season. Even so, heavy rains have been reported in the east of Chad as recently as September 20-26.

Normalized Vegetation Difference Index (NVDI) values derived from satellite imagery show all of Chad's sub-prefectures to be 'greener' for the September 1-20 period than the 1981 to 1985 average 'greenness' for that period. For sub-prefectures in the south, September 1-20 is the first period during this growing season that the 1986 NVDI has been well above the 1981-85 average, reflecting the poor rains there during late May through June. The lag in NVDI was strongest in Maissala Sub-prefecture, Moyen-Chari Prefecture, but is also seen for Kelo Sub-prefecture, Tandjile Prefecture, and for Logone Occidental Prefecture (Map 3). In the Sahelian zone (Map 1), the 1986 NVDI increased rapidly during July and early August compared to the five-year average, but has since slowed considerably, except in Bol Sub-prefecture, Lake Prefecture and Moussoro Sub-prefecture, Kanem Prefecture (Map 4). (See also the section on Satellite Imagery in Appendix II.)

PESTS
Grasshopper
Situation

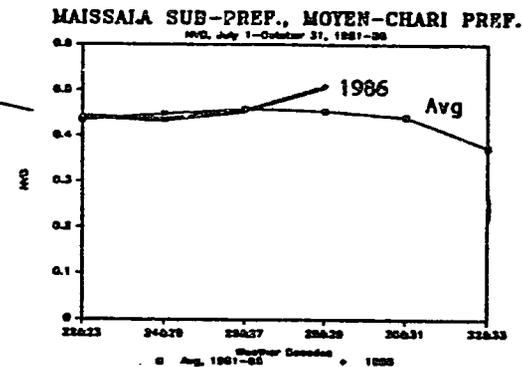
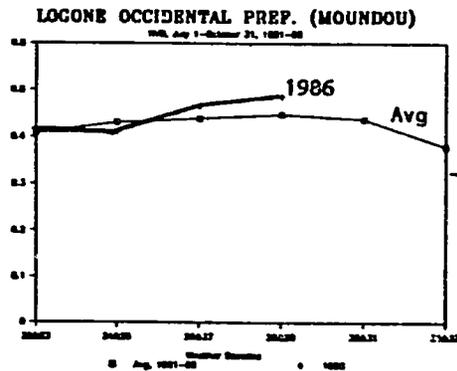
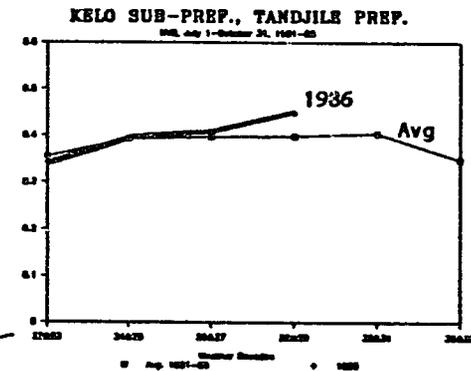
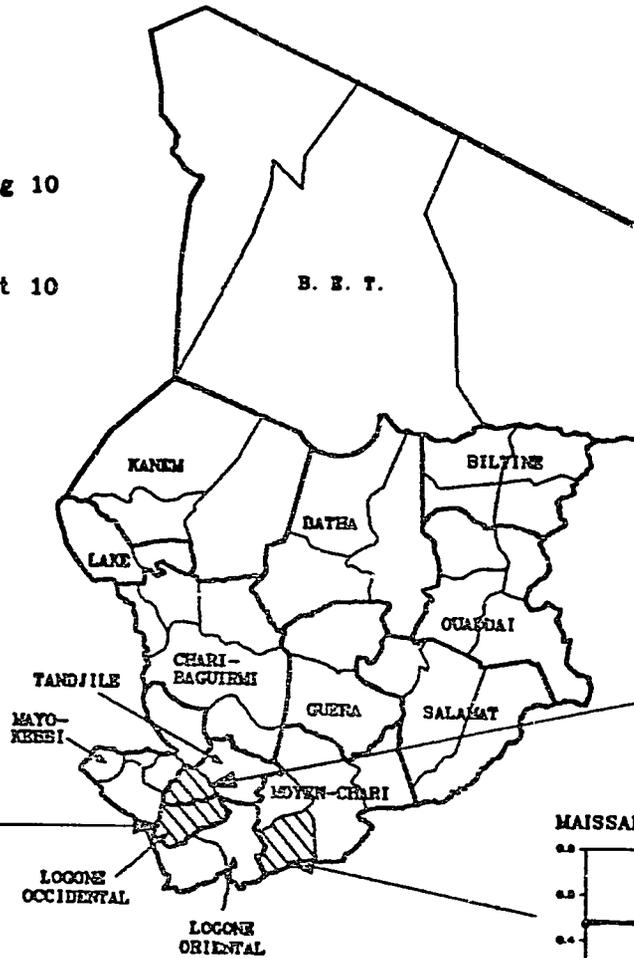
Most of the highly damaging grasshopper activity in Chad is occurring between 12N and 14N (Map 5). This zone produced only an estimated 17% of Chad's cereal harvest in 1985. The zone's portion of the total cereal harvest will most likely remain below 20% in 1986. Thus, the overall threat from grasshoppers to Chad's cereal harvest is minimal. On the other hand, spotty but severe infestations in northern Ouaddai Prefecture, southern Batha Prefecture and western Moyen-Chari Prefecture will cause 30-100% crop loss for individual villages which may therefore require food-aid assistance.

The AEDES August report cites high densities of grasshoppers in spots in N'Gouri Sub-prefecture, Lake Prefecture (60 and 90 per square meter), Massakory and Bokoro Sub-prefectures, Chari-Baguirmi Prefecture (40 and 20-30 per square meter), and Abeche and Adre Sub-prefectures, Ouaddai Prefecture (10.5 and 30-50 per square meter). Crop damage from grasshoppers was reported to be widespread in Massakory during August.

Map 3

CHAD: NVDI for Selected Sub-prefectures

Weather Decades	Period Covered
22 & 23	July 1-20
24 & 25	July 20-Aug 10
26 & 27	Aug 11-31
28 & 29	Sept 1-20
30 & 31	Sept 21-Oct 10
32 & 33	Oct 11-31

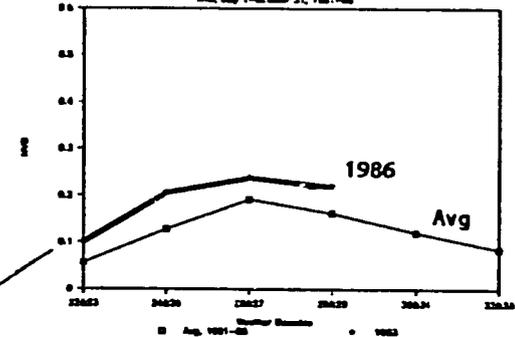


Map 4

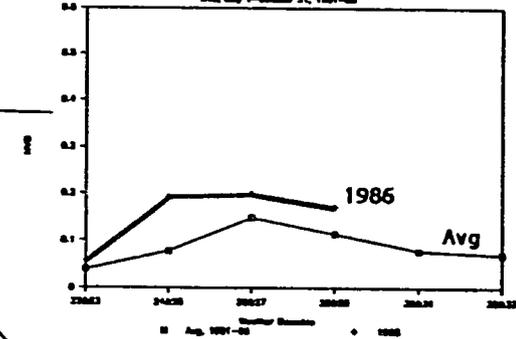
CHAD: NVDI for Selected Sub-prefectures

Weather Decades	Period Covered
22 & 23	July 1-20
24 & 25	July 20-Aug 10
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32 & 33	Oct 11-31

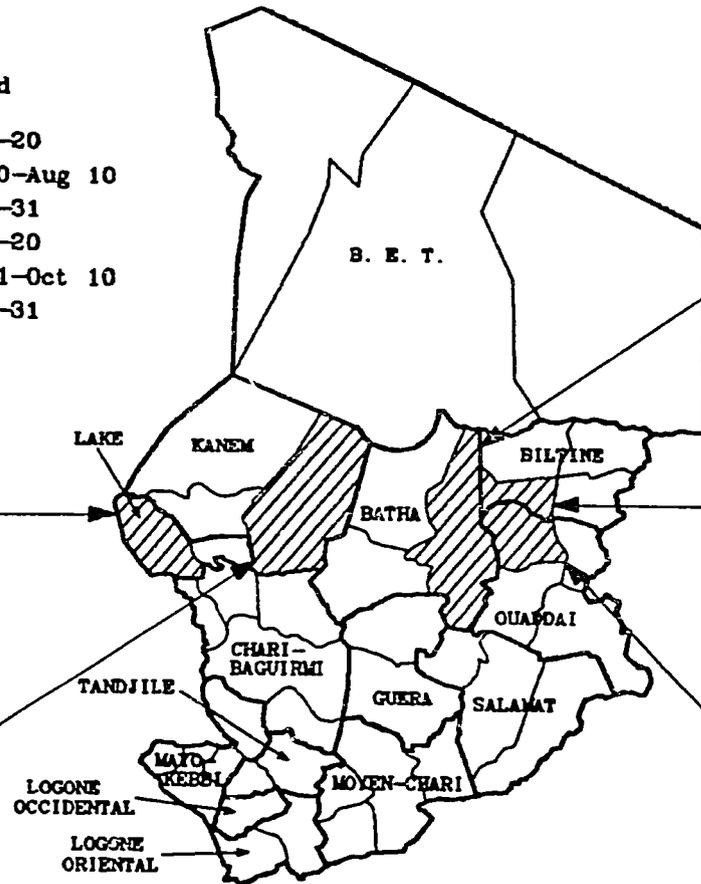
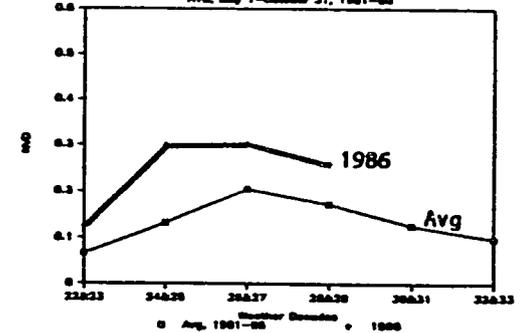
OUM HADJER SUB-PRF, BATHA PREFECTURE
1985, July 1-October 31, 1981-86



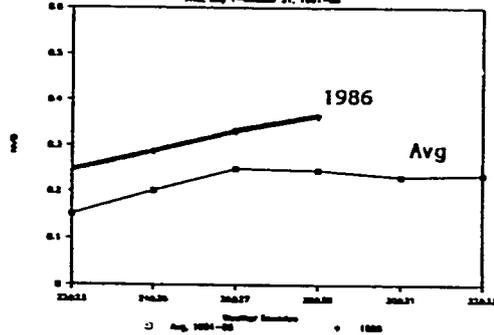
BILTINE SUB-PRF., BILTINE PREFECTURE
1985, July 1-October 31, 1981-86



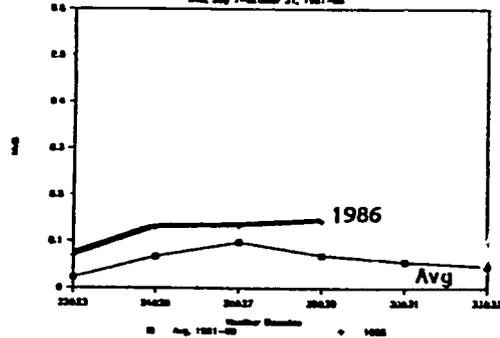
ABECHE SUB-PRF., OUADDAI PREFECTURE
1985, July 1-October 31, 1981-86



BOL SUB-PRF., LAKE PREFECTURE
1985, July 1-October 31, 1981-86

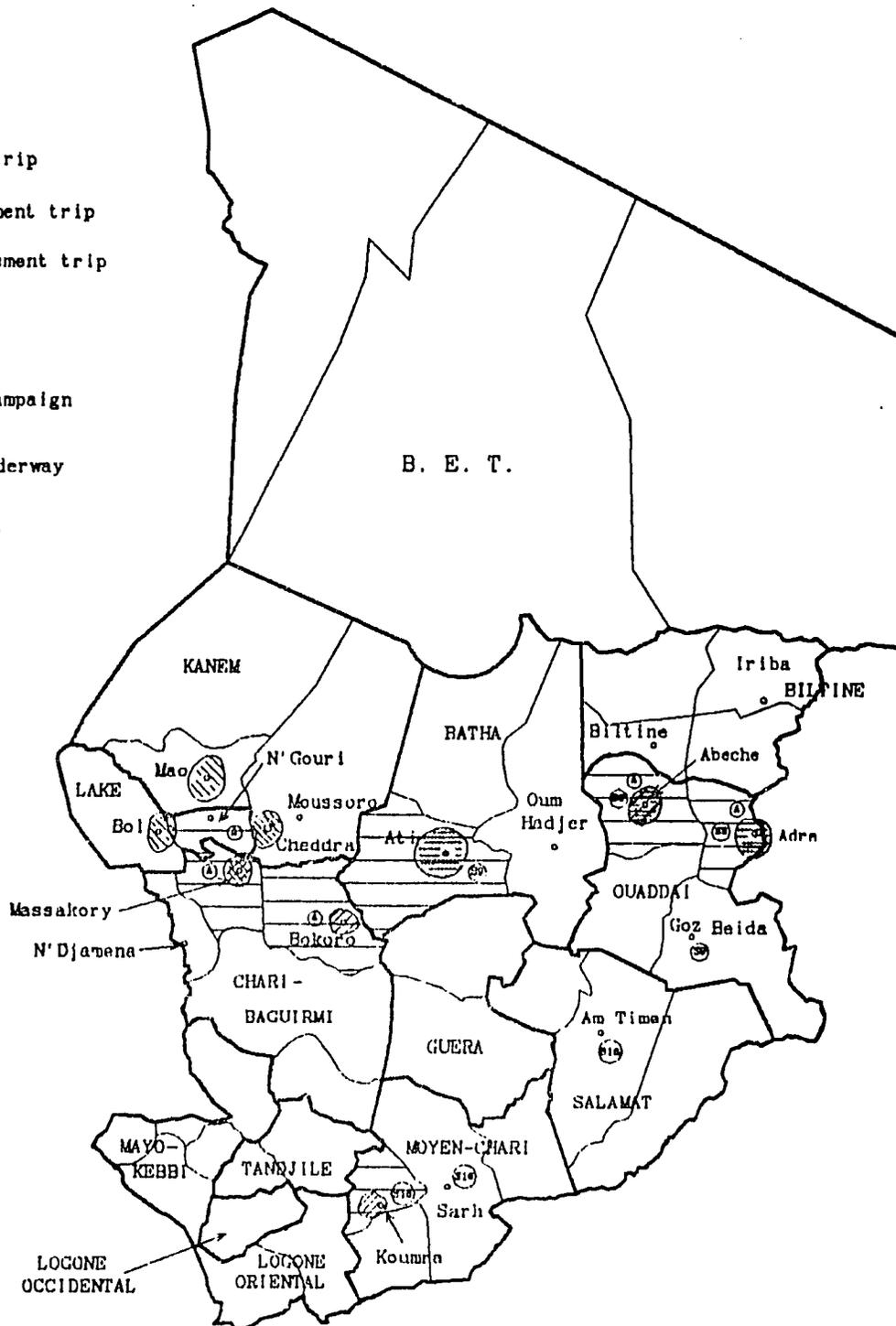


MOUSSORO SUB-PRF., KANEM PREFECTURE
1985, July 1-October 31, 1981-86



Map 5 CHAD: Grasshopper Summary

- ⊙ August grasshopper assessment trip
- ⊙ September 9 grasshopper assessment trip
- ⊙ September 16 grasshopper assessment trip
- ☞ Area containing patches of high density infestations
- ▨ Area awaiting aerial control campaign
- ▨ Aerial control completed or underway
- ▨ Ground control efforts underway



On September 8 and 9, a joint USAID, US Department of Agriculture, UN Food and Agriculture Organization (FAO), Ministry of Agriculture (MINAG) and Chadian Crop Protection Service (CCPS) team visited five localities in eastern Chad by airplane (Abeche, Adre and Goz-Beida in Ouaddai Prefecture, Ati in Batha Prefecture and Biltine in Biltine Prefecture). While little grasshopper activity was found in Goz-Beida and Biltine, significant millet crop destruction from O. senegalensis had occurred, or was in the process of occurring, in Abeche, Adre and Ati ((S9) on Map 5). Severe grasshopper infestations were found near Adre in Adre Sub-prefecture, Ouaddai Prefecture (100% crop loss in fields inspected by team), fairly severe infestation was seen in fields within a 10 kilometer radius of Abeche in Ouaddai Prefecture (one of the three fields visited showed 100% crop loss, partial harvest of the rest was judged possible if control began within one week of the visit), and heavy infestation was found near Ati in Ati Sub-prefecture, Batha Prefecture (up to 50% loss of millet crop as of the September 8-9 visit). The team predicted 100% crop loss for areas close to the named towns if aerial spraying did not begin by September 20, which it has not.

A repeat trip to Abeche on September 24-25 confirmed grasshoppers still to be a serious problem. Densities of 5 to 20 grasshoppers per square meter were found in the millet fields. An estimated 4,600 hectares (ha), presumed to be all cropland, were found to require aerial treatment. If the continuing rainfall produces new growth of grasses, the grasshoppers may be attracted away from the millet, decreasing pest-stress on the crops.

A similar joint assessment trip was made on September 16 and 17 to Sarh and Koumra Sub-prefectures in Moyen-Chari Prefecture, Moundou, in Logone Occidental (West Logone) Prefecture, Bokoro Sub-Prefecture, Chari-Baguirmi Prefecture and Am Timan Sub-prefecture in Salamat Prefecture ((S16) on Map 5). In most of these areas, grasshopper densities were normal and were not considered to be a serious threat (e.g., crops near Am Timan showed 0.05 grasshoppers per square meter, while adjacent grassland had 0.3 grasshoppers per square meter). The main exception was in Koumra (Mandoul Valley). Some fields in the west of the sub-prefecture showed 100% crop loss as of September 17, with as much as 1,500 ha infested. Based on estimates of acreage planted in 1985, the infested area represents at most 1.3% of cereal cropland in Moyen-Chari, and 0.1% of cereal cropland in Chad overall. Food aid has been sent to this area to encourage farmers to not move out, thus abandoning cotton

fields. (The Koumra area experienced a devastating, famine-producing Migratory Locust infestation in 1947 which is still vividly remembered.)

Grasshopper Control

The spray helicopter contracted by FAO arrived on September 14, allowing short-range aerial spraying to begin. One of the long awaited fixed-wing aircraft necessary for longer-range spraying flights arrived in Chad on September 26. However, aircraft use will be postponed until insured, increasing potential crop loss in the affected areas in eastern Chad (Map 5). Ground control efforts are underway, but are hampered by shortage of equipment, fuel and supplies. As of September 15, the total area requiring aerial treatment was estimated at 160,000 ha. By September 26, the spray-helicopter had covered 10,000 ha near Bol in Lake Prefecture, Massakory in Chari-Baguirmi Prefecture, and Cheddra in Kanem Prefecture and had moved on to Mao, also in Kanem Prefecture (Map 5).

Ground treatment of 170 ha began on September 12 in Bokoro Sub-prefecture, Chari-Baguirmi Prefecture. Although the control efforts caused significant grasshopper mortality, reinfestation from adjacent grasslands was already occurring by September 17. ONDR (the Chadian agricultural extension service) estimated that a total of 10,000 ha in Bokoro Sub-prefecture required ground treatment, out of a total 18,000 ha planted in crops. Ground treatment of 1,200 ha has taken place near Massakory, also in Chari-Baguirmi Prefecture. Farmers were able to treat about 1,000 ha of crops in the Abeche area in Ouaddai Prefecture, but reinfestation from adjacent, untreated grasslands again occurred within a few days. Ground treatment was to begin in Koumra, Moyen-Chari Prefecture, as soon as sufficient equipment and supplies arrived.

The Mission is currently working to create a follow-up insect control program for at least the next two years. The conclusion of the current campaign, while this years bottle-necks, mistakes and successes are still in-mind, would be the time to finish any plans for monitoring grasshopper activity and controlling their spread during the coming year. Such advanced planning will help keep future infestations from becoming repeat emergencies.

Other Pests

The locust watch has been on in Chad for two months, and to date there have been no confirmed sightings of gregarious swarms, although groups of solitary phase adult locusts have been verified in several locations,

including Ati Sub-prefecture, Batha Prefecture, and Iriba Sub-Prefecture, Biltine Prefecture. The aerial spray program begun in Bol on September 17 should be sufficient to keep the locust situation under control.

A new pest on the scene is the bore worm, which has heavily infested millet fields in parts of Batha Prefecture, and to a lesser extent in central and eastern Chari-Baguirmi Prefecture, since August. These worms could become a major problem in Guera Prefecture also.

AGRICULTURE

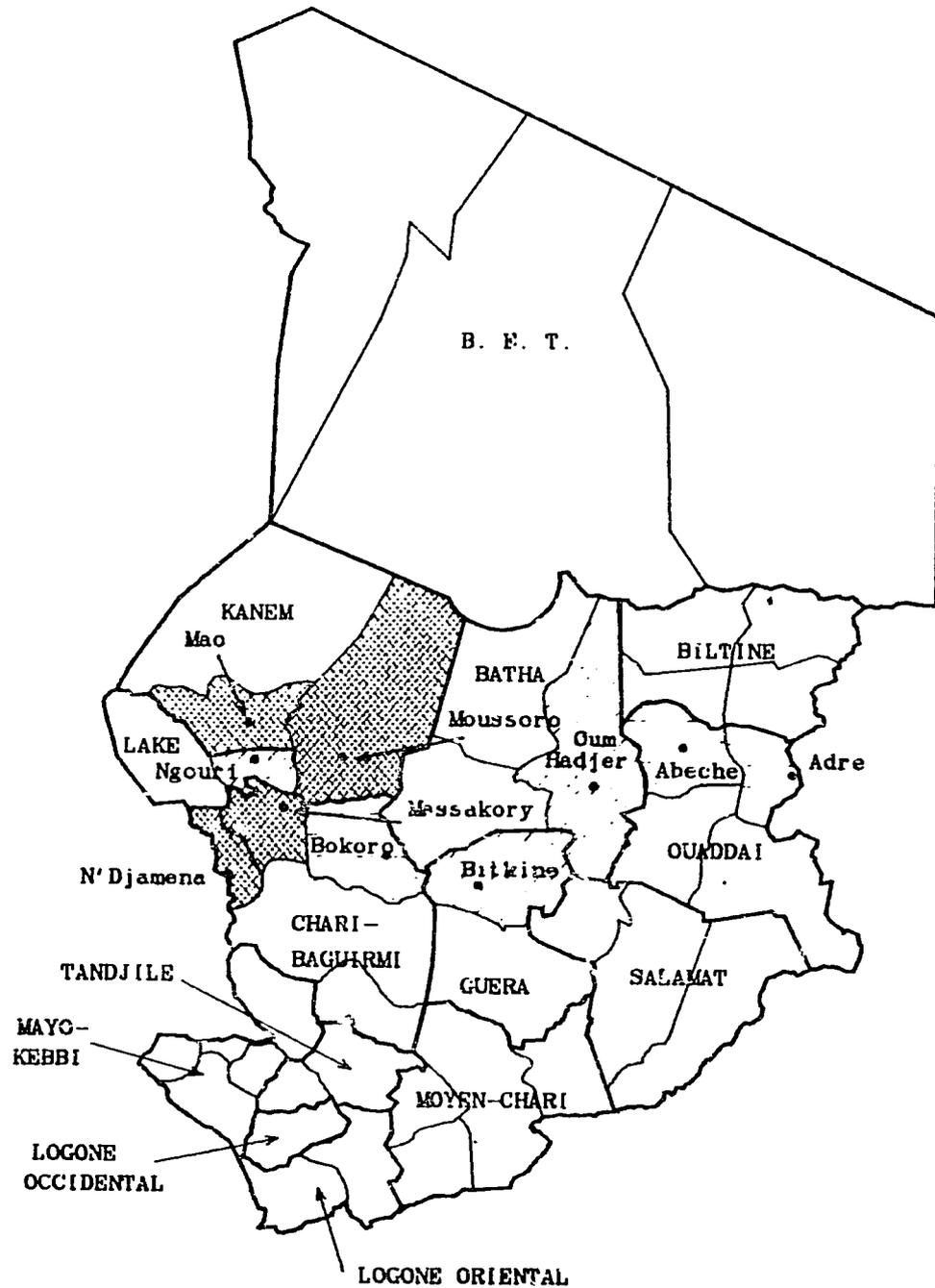
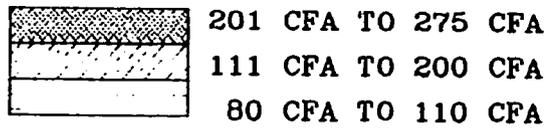
The current crop situation looks quite promising in all of the major crop producing areas (Sudanian zone), and in all but a few isolated spots of the Sahelian zone (Map 1). Acreage devoted to food production is reported by the Mission to have increased over last year, although quantity and prefectural or sub-prefectural breakdown of acreage planted were not included in that report.

By early September, early-variety millet was heading in Lake and Kanem Prefectures. Along the N'Djamena-Guelendeng-Bongor axis, both millet and short-cycle sorghum were heading, some sorghum had entered the mature phase, and many markets in the area already featured maize, cucumbers and peanuts. Further south, long-cycle millet and sorghum continued in the stalk elongation stage, although corn and peanuts were abundant in the markets. By late September, the millet harvest should have begun in the northern and mid zones, with the southern harvest following in October (Map 1).

Market prices of a 2.5 kg measure of millet have remained at about the same level, or even decreased, in most areas since June, a change from the usual in that prices normally increase during the period just before harvest (Table I, Appendix II). This implies both that there are plenty of millet reserves in most of the country and that Chadians themselves are optimistic about the upcoming harvest. The price of millet has been highest in the main towns nearest the villages at highest risk, indicating that millet has been scarcer in those markets than in the rest of the country (Map 6). Even so, the price in these towns remained steady through most of the summer and then dropped during August. Two possible factors in this surprising price decline in an area said to contain highly at-risk villages are: the presence of Lake Prefecture maize on the market in large quantities, which would depress the price of millet; and strong optimism about the millet harvest in other regions.

Map 6

CHAD: Millet Price
at Town Markets,
August, 1986*



*See Table 1 in Appendix I for further detail

Map: FEWS/PWA, October 1986

10-

Rainfall-based prefectural crop yield forecasts for millet and sorghum by the National Environmental Satellite, Data, and Information Service of the National Oceanic and Atmospheric Administration (NOAA/NESDIS) support the feeling of optimism. Most of the Sahelian and Sudano-sahelian prefectures show a strong increase in yield over the historical average (Maps 7 and 8). Only Guera Prefecture appears below its average for millet yield and exactly at average for sorghum yield. It was previously reported that in Guera Prefecture twice the millet acreage planted in 1985 had been planted in 1986. This could have been a loss-minimizing strategy by the farmers in response to perceived poor rains, bearing out the NOAA/NESDIS analysis. (See also Tables 2 and 3 in Appendix II.)

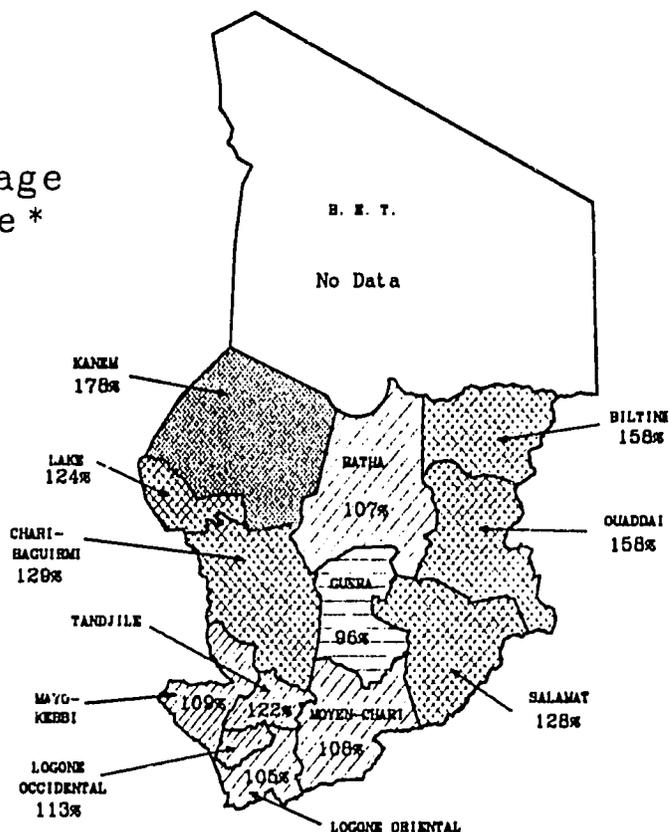
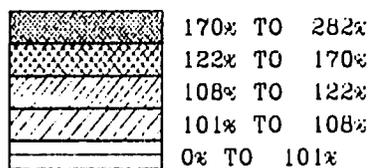
The reported higher-than-usual acreage planted will have a positive effect on crop production. Pest damage will have a major negative effect on crop production this year for isolated patches in Lake, Kanem, Chari-Baguirmi and Ouaddai Prefectures. The extent of that damage will depend in part on the timing of insect control programs and any subsequent rains.

Periods of drought have also caused damage. Drought in N'Gouri Sub-prefecture of Lake Prefecture has been intense enough to show in the NVDI derived from satellite imagery. The usual pattern in Chad is for the NVDI to peak during the August 11-31 period. In N'Gouri, the peak appears to have occurred earlier, during the July 21-August 10 period, although the absolute NVDI level is still higher than the average NVDI for the previous five years (Graph 1).

Arada Sub-prefecture, Biltine Prefecture, experienced a 20-day period of dryness in August which wilted up to 50% of the crop fields. The satellite imagery for that area shows the vegetation to be denser than the average for the previous five years, but also to be neither prospering nor declining during a forty-day period from mid-August to mid-September (Graph 2). Arada is at the northern boundary for crop production in Chad, so that the majority of what the satellite picks up is pasture-land, which recuperates quickly with a small amount of rainfall. Reports from the ground in such areas are vital to assess the status of crops, which are a small percentage of the ground cover and which can be permanently destroyed if wilted at the wrong time.

Map 7

CHAD: NOAA Predicted
1986 Millet Yield
as Percent of Average
Yield per Prefecture *

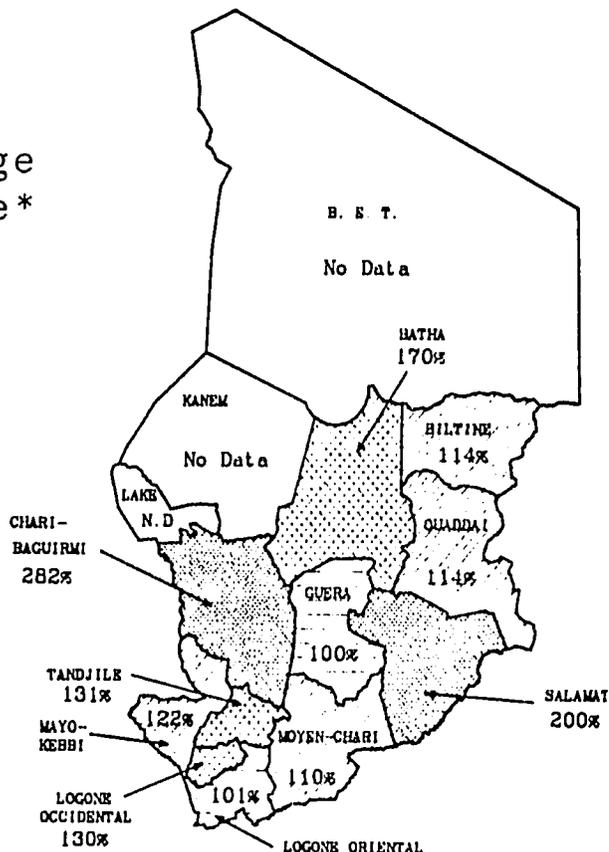
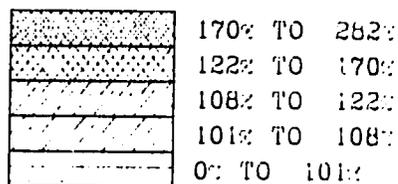


*See Tables 2 & 3 in Appendix II for further detail

Map: FEWS/PWA, October 1986

Map 8

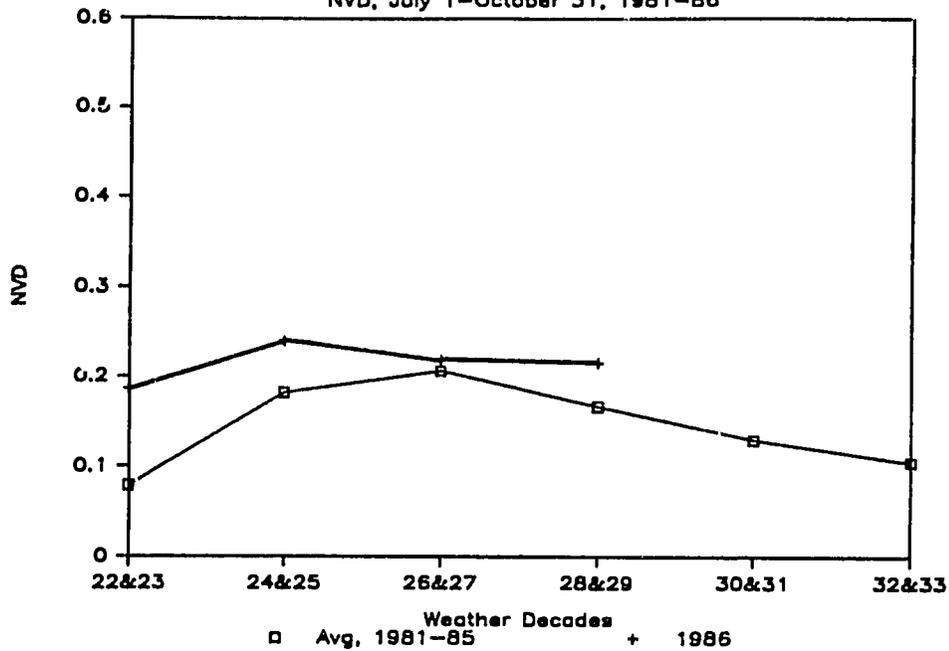
CHAD: NOAA Predicted
1986 Sorghum Yield
as Percent of Average
Yield per Prefecture *



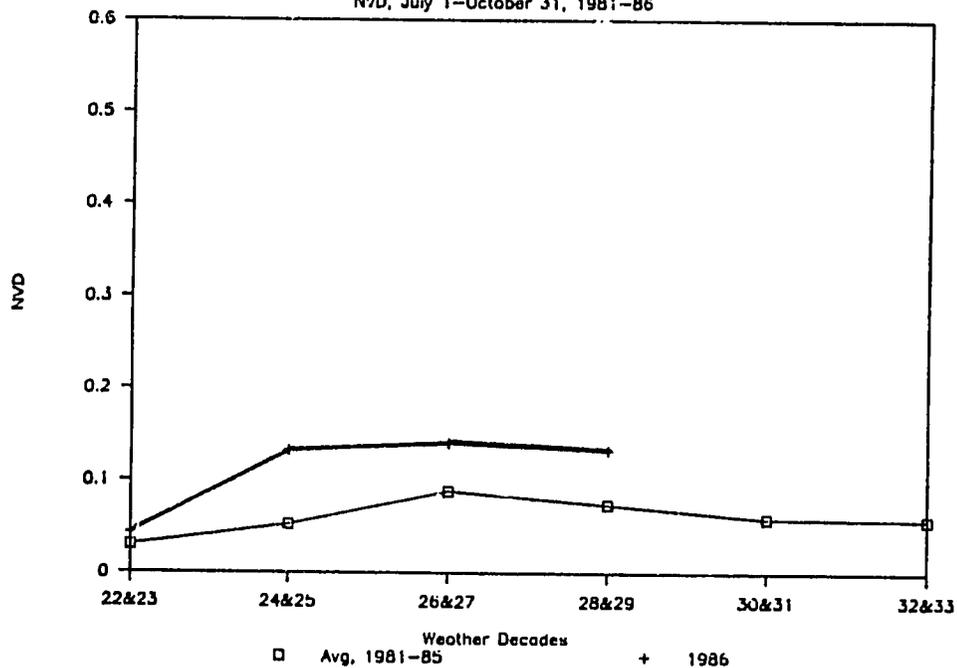
*See Tables 2 & 3 in Appendix II for further detail

Map: FEWS/PWA, October 1986

Graph 1 **NGOURI SUB--PREF., LAKE PREFECTURE**
 NVD, July 1--October 31, 1981--86



Graph 2 **ARADA SUB--PREF., OUADDAI PREFECTURE**
 NVD, July 1--October 31, 1981--86



Weather Decades	Period Covered
22 & 23	July 1-20
24 & 25	July 20-Aug 10
26 & 27	Aug 11-31
28 & 29	Sept 1-20
30 & 31	Sept 21-Oct 10
32 & 33	Oct 11-31

FOOD FLOWS/NEEDS

A mid-September Mission cable puts country-wide food storage capacity at 85,000 MT, of which 23,000 MT capacity is in use. This includes approximately 11,600 MT of grain which the GOC has prepositioned at main prefectural towns (Table 1). One-quarter of the 10,000 MT of U.S. sorghum pledged as a start-up for fiscal year 1987 is enroute to N'Djamena. The remainder has not yet been called forward. Of 10,000 MT of rice pledged by Italy, 1,500 MT had arrived by August 8.

Food distribution is taking place in response to small, geographically bounded emergencies, such as the grasshopper invasion in Koumra Sub-prefecture, Moyen-Chari Prefecture. Food-aid grain has been prepositioned in anticipation of need in nine of Chad's 14 prefectures. As can be seen, however, reserves are quite low at Mao, the central grain store closest to the area considered to be at highest risk (Map 2).

Table 1: Central Grain Stores in Prefectures*

Prefecture	Town	Amount (MT)
Mayo-Kebbi	Pala	253.6
Moyen-Chari	Sarh	402.0
Logone Occid.	Moundou	542.7
Ouaddai	Abeche	903.3
Guera	Mongo	388.8
Kanem	Mao	29.6
Batha	Ati	1,128.4
Chari-Baguirmi	N'Djamena	3,933.2
Salamat	Am Timan	1,185.7
Total		11,594.2

Source: GOC, National Office of Cereals

* See Map 9 for locations of towns.

POPULATIONS AT-RISK

Irregular rainfall, late planting, bore worms, rats and grasshoppers have combined to create isolated food supply shortages despite the generally good cereals production outlook for Chad as a whole. Several villages in N'Gouri Sub-prefecture (Lake Prefecture), Mao Sub-prefecture (Kanem Prefecture) and Massakory Sub-prefecture (Chari-Baguirmi Prefecture) are at "very high risk" according to AEDES (Map 2).

Areas at less risk than these villages, but still under stress, include: Iriba, Arada and Biltine Sub-prefectures of Biltine Prefecture (wilted fields following irregular rainfall); and Ati Sub-prefecture of Batha Prefecture, Koumra Sub-prefecture of Moyen-Chari Prefecture.

ure and Adre and Abeche Sub-prefectures of Ouaddai Prefecture (crop damage from grasshoppers).

There have been no new reports from nutrition surveys this month. The stability and generally low level of market prices for the staple millet noted above, however, would imply a stability in food availability, which would in turn lead to an overall stability in nutrition status. Disease conditions cited in previous FEWS reports were quickly brought under control through the efforts of the GOC Division of Epidemics, and are no longer of concern.

Population movements within Chad have been minimal. For the most part, population movement that was noted was that of people returning to areas in Batha, Guera and Ouaddai Prefecture, and to Guereda Sub-prefecture in Biltine Prefecture, presumably to participate in the harvest. It is not anticipated that these population movements will put any stress on food reserves in those areas.

Appendix I

FEWS does not collect primary data. Rather, it receives information from various domestic U.S. and international agencies and private voluntary organizations, and from government agencies in the countries under study. The information is then examined, compiled and analyzed for its predictive potential. Without the ongoing cooperation of all these organizations, FEWS could not function.

In particular, the fifth Chad report owes a debt to various offices of the US Agency for International Development (AID), National Oceanic and Atmospheric Administration's National Environment Satellite, Data, and Information Service's Assessment and Information Services Center (NOAA/NEDIS/AISC), the US Geological Survey's Earth Resource Observation Satellite Data Center (USGS/EROS), the National Aeronautics and Space Administration Earth Resources Branch (NASA/ERB), and USAID/-N'Djamena; the Government of Chad Ministry of Agriculture, Ministry of Public Health and Ministry of Plan; the UN Food and Agriculture Organization (FAO) Global Information and Early Warning System; the European Agency for Development and Health (AEDES) Early Alert System Project; AGRHYMET; and Permanent Diagnosis Project of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS).

**Appendix II
Additional Information**

Market Price of Millet

Table 1: Market Price of Millet per Coro (approx 2.5 kg)

Location	June '86 (CFA)	July '86 (CFA)	August '86 (CFA)
Chari-Baguirmi			
Bokoro	150	140	110
Massakory	250	250	250
N'Djamena	200	175-250	200-250
Lake			
N'Gouri	275-300	225	150
Kanem			
Moussoro	300	250	275
Mao	325	300	225
Ouaddai			
Abeche	100	100	100
Adre	50-75	50-85	80
Guera			
Bitkine	150	150	125
Batha			
Oum-Hadjer	175	150	175

Source: AEDES/Chad

NOAA/NESDIS Forecast

Table 2: 1986 Millet and Sorghum/Percent of Average* Yield

Prefecture	Millet			Sorghum		
	Avg Yld (kg/ha)	1986 (kg/ha)	% of Avg	Avg Yld (kg/ha)	1986 (kg/ha)	% of Avg
Batha	270	290	107	200	340	170
Chari-Baguirmi	420	540	129	170	480	282
Guera	520	500	96	530	530	100
Kanem	180	320	178	-	-	-
Lake	330	410	124	-	-	-
Ouaddai/Biltine	240	380	158	420	480	114
Salamat	460	590	128	260	520	200
Tandjile	490	600	122	550	720	131
Logone Occidental*	550	620	113	560	730	130
Logone Oriental*	650	680	105	770	780	101
Mayo-Kebbi*	530	580	109	600	730	122
Moyen-Chari*	610	660	108	610	670	110

Source: NOAA/NESDIS

Using the forecast yield figures for 1986 and the historical average crop area in each prefecture, the following harvest prediction results:

Table 3: 1986 Gross Crop Production Based on NOAA/NESDIS Forecast

Prefecture	Millet		Sorghum	
	Avg Area (000 ha)	1986 Prod (MT)	Avg Area (000 ha)	1986 Prod (MT)
Batha	35.1	10,179	14.7	4,998
Chari-Baguirmi	22.3	12,042	11.9	5,712
Guera	17.6	8,800	23.5	12,455
Kanem	44.9	14,368	-	-
Lake	19.9	8,159	-	-
Ouaddai/Biltine	30.6	11,628	12.9	6,192
Salamat	2.7	1,593	10.2	5,304
Tandjile	23.0	13,800	43.3	31,176
Logone Occidental*	17.6	10,912	39.5	28,835
Logone Oriental*	21.7	14,756	61.4	47,892
Mayo-Kebbi*	25.8	14,964	95.5	69,715
Moyen-Chari*	45.3	29,898	68.6	45,962
Total		151,099		258,241

Source: NOAA/NESDIS

* Baseline averages from 1981-1984 if marked '*.' Otherwise they are from 1983-1985. The averages are based on Government of Chad (GOC) historical data.

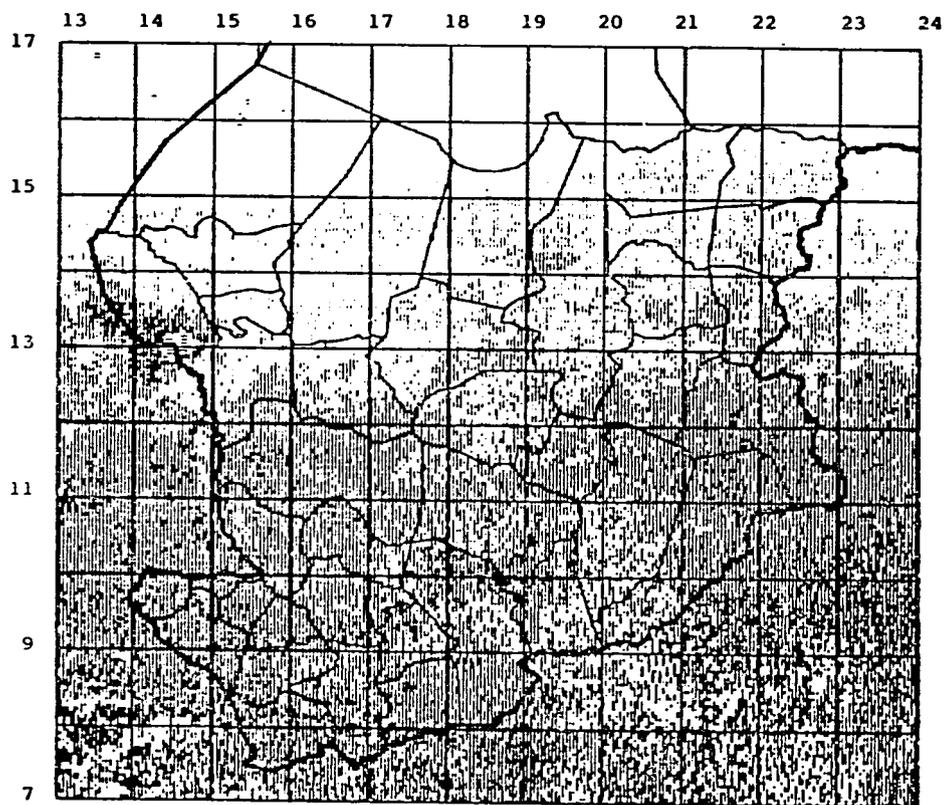
**Satellite Imagery
(See Map 9 for
location of areas
named)**

Figure I shows the vegetation images for Chad below 17N for the periods of August 21-31 and September 11-20. Over this period, the sparse vegetation north of 13N has not moved any further north, as had happened over previous months, but it has filled in, giving a much more solid picture. The northern boundary of mid-level vegetation stayed between 12N and 13N during this period. It also filled in below 12N, but previous patches of mid-level vegetation north of 13N have begun to disappear. The patches of heavy vegetation in south central Chad, most notably in Melfi Sub-prefecture, Guera Prefecture, have increased in area.

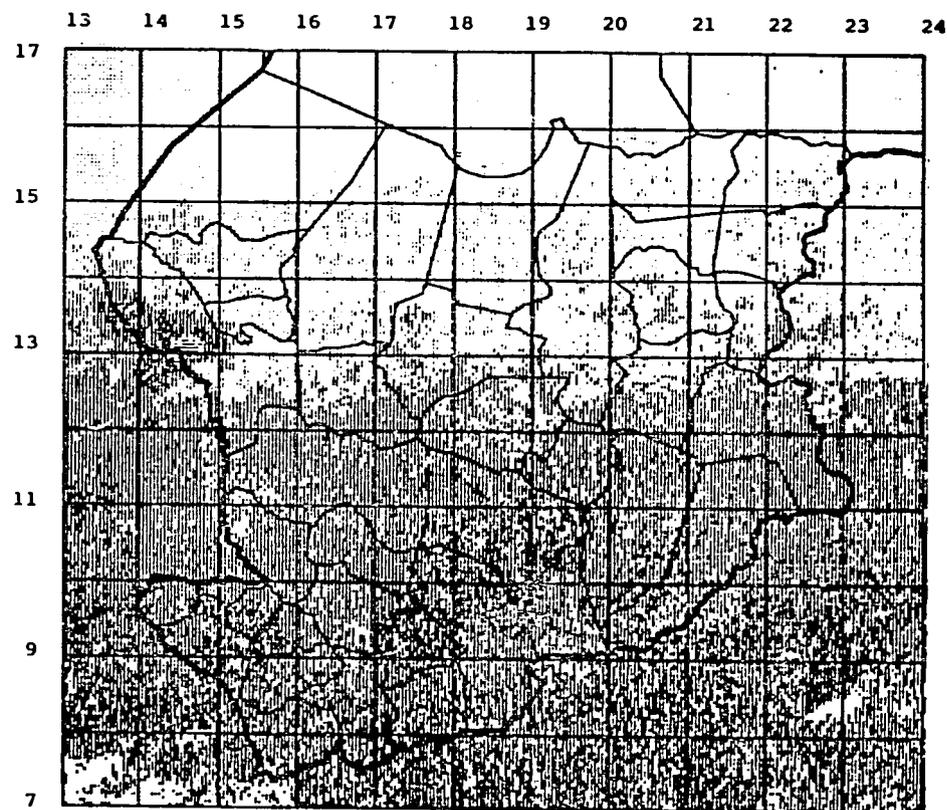
Figure II looks at positive and negative differences in vegetation cover between 1985 and 1986 for the period of September 11-20. The most striking area of positive difference is north of Lake Chad. Improvement is fairly widespread except for southern Batha, eastern Guera and patches of Biltine and Ouaddai Prefectures. The negative image complements this picture, especially at the conjunction of Ati, Djedaa and Oum-Hadjer Subprefectures of Batha Prefecture, southern Oum-Hadjer Sub-prefecture, and Biltine and northern Iriba Sub-prefectures of Biltine Prefecture. The negative image also shows negative patches along the Bokoro, Chari-Bagurimi Prefecture/Moussoro, Kanem Prefecture, boundary, the Moyen-Chari Prefecture/Logone Oriental Prefecture boundary, and the N'Djamena-Massakory, Chari-Baguirmi Prefecture/N'Gouri, Lake Prefecture border area.

None of these images can be used to predict crop yield directly, as each dot/block shows the average amount of greenness over some 20 to 25 square kilometers. Much of the greenness that shows up will be pastureland and other vegetation such as trees and bushes. It is safe to say that an area with no ground cover will likely have poor crop yield, but even good growth shown on these images may hide localized areas of dryness.

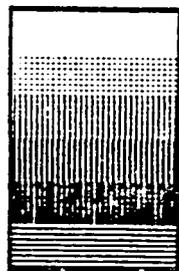
Figure I Chad Below 17 Degrees North Latitude, August & September, 1986



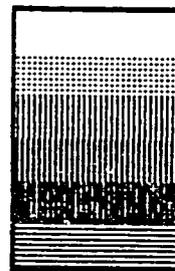
Chad, Vegetation Image
August 21-31, 1986



Chad, Vegetation Image
September 11-20, 1986

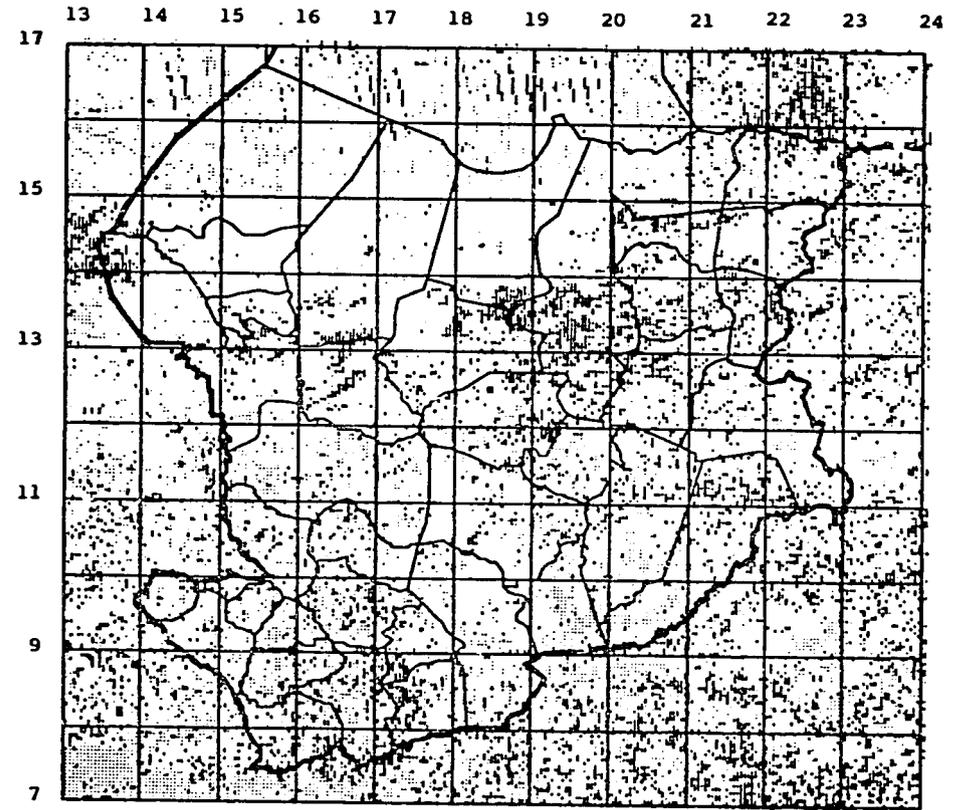
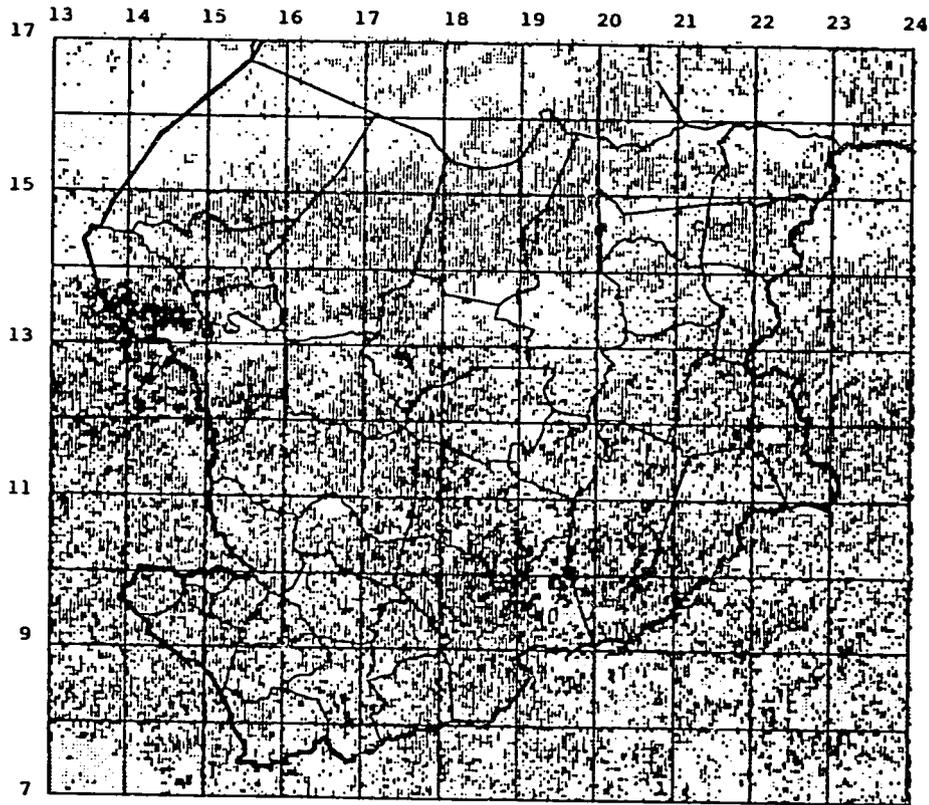


5626	10.5672%	Clouds
11107	20.8621%	Bare Soil
9875	18.5481%	Sparse Vegetation
20851	39.1642%	Vegetation
5740	10.7814%	Heavy Vegetation
41	0.0770%	Water, Mud



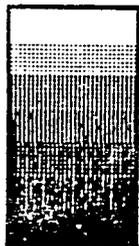
3379	6.3467%	Clouds
10479	19.6826%	Bare Soil
11178	20.9955%	Sparse Vegetation
20664	38.8129%	Vegetation
7502	14.0909%	Heavy Vegetation
38	0.0714%	Water, Mud

Figure II Comparison Of September 11-20, 1986 With September 11-20, 1985



Chad, Positive Change in Vegetation
September 11-20, 1985-86

Chad, Negative Change in Vegetation
September 11-20, 1985-86



22166	41.6341%	No Change, or Negative Change
6132	11.5177%	Clouds in Either Image
12373	23.2400%	1 Category Improvement
7274	13.6627%	2
3325	6.2453%	3
1164	2.1863%	4
806	1.5139%	5 or more Category Improvement



39635	74.4459%	No Change, or Positive Change
6132	11.5177%	Clouds in Either Image
5187	9.7427%	1 Category Decline
1613	3.0297%	2
452	0.8490%	3
137	0.2573%	4
84	0.1578%	5 or more Category Decline

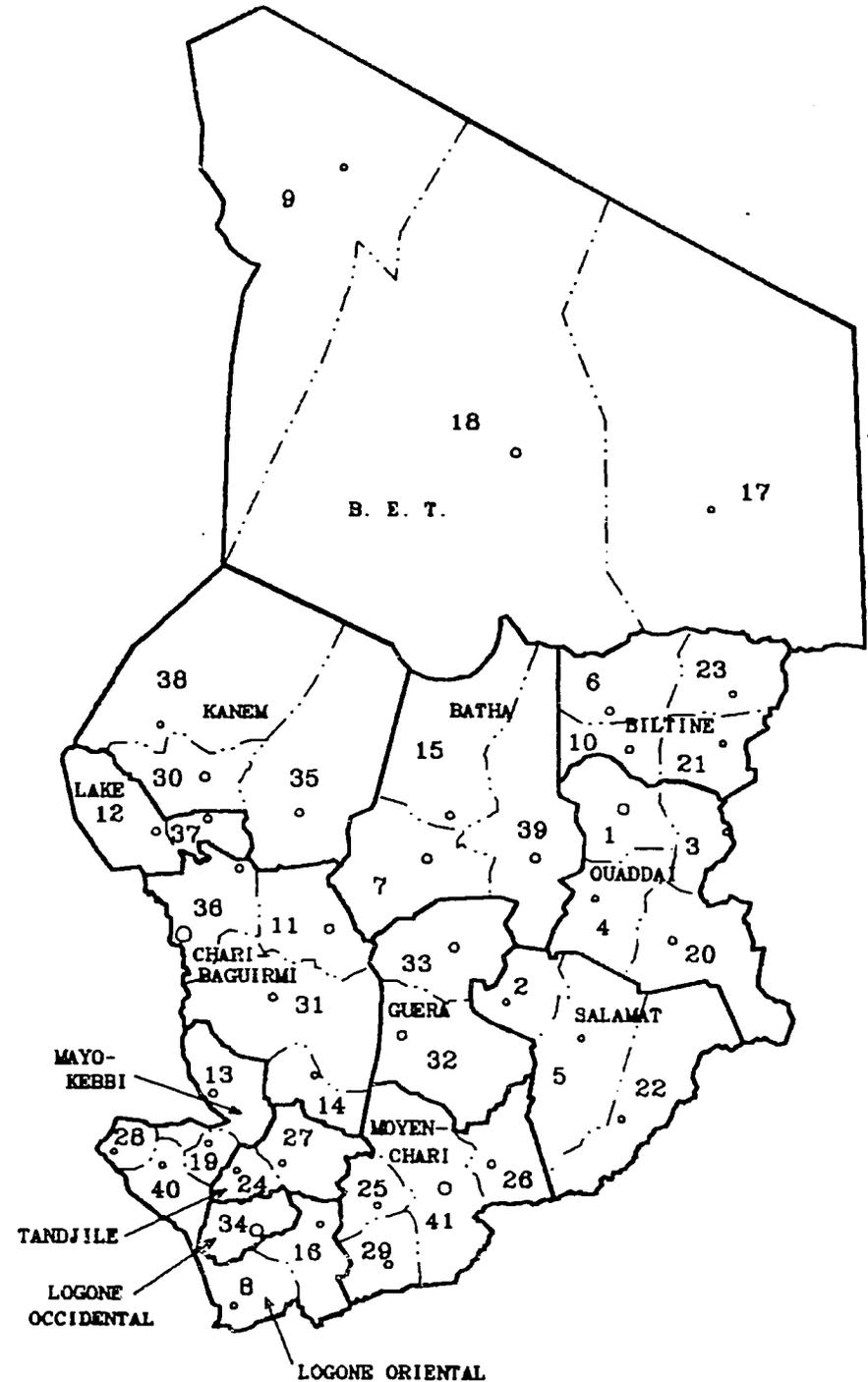
21.

Map 9

CHAD: Sub-prefectures

- | | |
|------------------|---------------------------|
| 1. ABECHE | 22. HARAZE |
| 2. ABOU DEIA | 23. IRIBA |
| 3. ADRE | 24. KELO |
| 4. AM DAM | 25. KOUMRA |
| 5. AM TIMAN | 26. KYABE |
| 6. ARADA | 27. LAI |
| 7. ATI | 28. LERE |
| 8. BAIBOKOUM | 29. MAISSALA |
| 9. BARDAI | 30. MAO |
| 10. BILTINE | 31. MASSENYA |
| 11. BOKGRO | 32. MELFI |
| 12. BOL | 33. MONGO |
| 13. BONGOR | 34. MOUNDOU |
| 14. BOUSSO | 35. MOUSSORO |
| 15. DJEDAA | 36. N' DJAMENA/ MASSAKORY |
| 16. DOBA | 37. N' GOURI |
| 17. FADA | 38. NOKOU |
| 18. FAYA-LARGEAU | 39. OUM HADJER |
| 19. GOUNOU | 40. PALA |
| 20. GOZ BEIDA | 41. SARH |
| 21. GUEREDA | |

○ Main town in sup-prefecture



Map: FEWS/PWA, October 1986

22