

**BURKINA**  
**VULNERABILITY ASSESSMENT**

**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 (for more information on FEWS publications turn to the back inside cover of this report); 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.

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# BURKINA

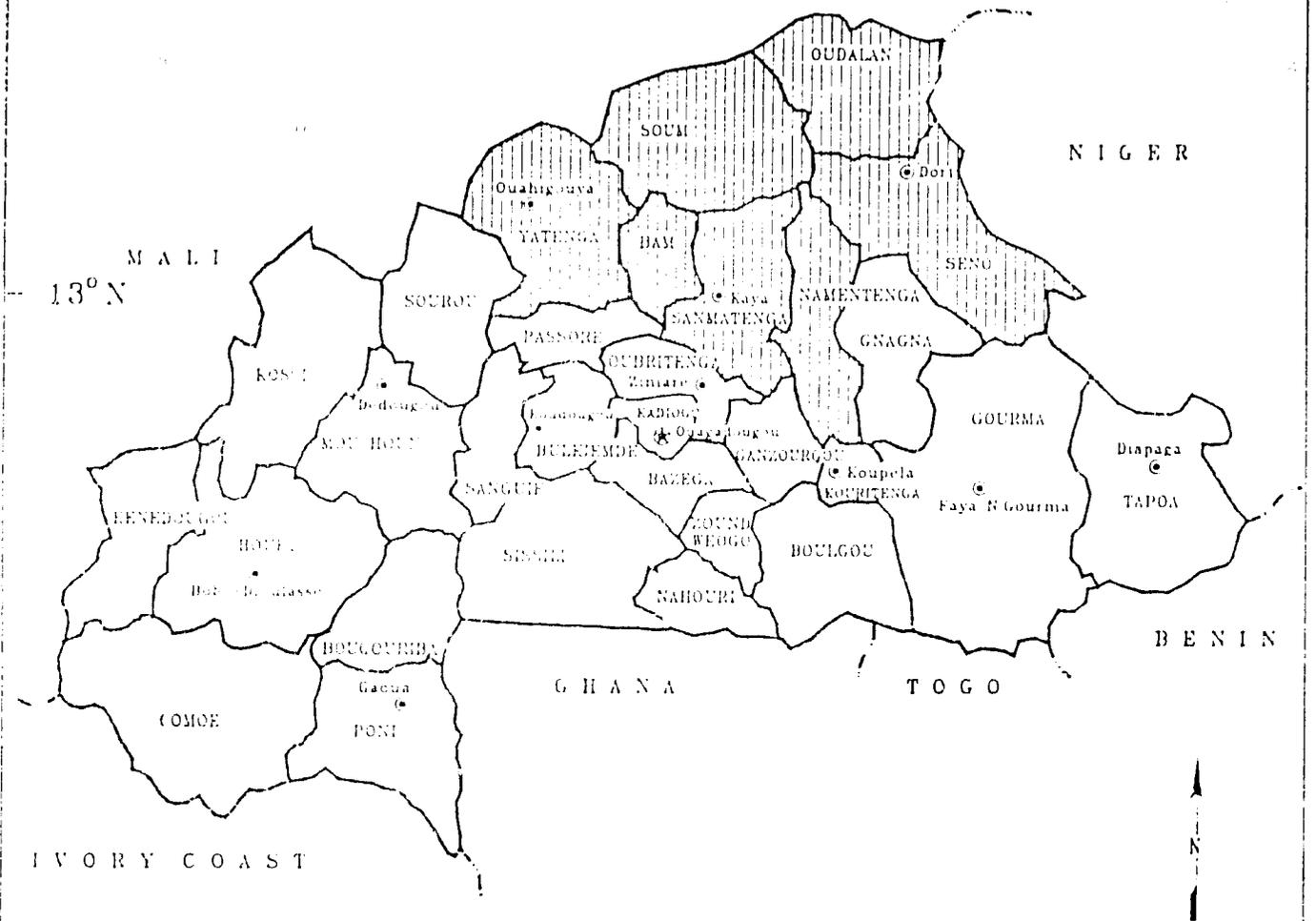
## Vulnerability Assessment

June 1988

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# Areas Vulnerable to Food Shortage



⊗	National Capital
⊙	Regional Capitals
---	International Boundaries
—	National & Regional Boundaries
	Vulnerable areas

0 25 50 75 Miles  
0 50 100 Kilometers

## Vulnerability Assessment

### SUMMARY

An integration of indicators of food availability and its consequences produces a picture of vulnerability in northern Burkina. Areas of high, continuing vulnerability are listed below. All of these areas have been declared at risk of food shortage, either by the donor-funded Système d'Alerte Précoce (SAP) or by the Government of Burkina (GOB). Aid is being distributed in all of these provinces.

- Oudalan Province is traditionally an area of low production, low agricultural potential, and high production variability. Oudalan Province has usually been able to produce 31% of its grain needs. Last year's harvest met only 20% of needs in the area.
- Soum Province has been an area of low production, low agricultural potential and high production variability. Soum, on average, produces 48% of its cereal needs. Last year's harvest will satisfy only 28% of needs.
- Seno Province has been an area of low production, low agricultural potential and high production variability. Seno, on average, produced 43% of its cereal needs. Last year's harvest satisfied 38%.
- Yatenga Province has been an area of low production, low agricultural potential and high production variability. Yatenga Province, on average, has produced 45% of its cereal needs. Last year's harvest met 48% of the province's needs.
- Bam Province has been an area of low production, low agricultural potential and high production variability. Bam Province, on the average, produces 74% of its cereal needs. Last year's harvest met only 32% of local needs.
- The northern part of Sanmatenga Province (the area most vulnerable within the province) has historically been an area of low production, low agricultural potential and high production variability. Sanmatenga Province, on average, produces 76% of its cereal needs. Last year's harvest satisfied only 52% of local needs.
- The northern part of Namentenga Province (the area most vulnerable within the province) has been an area of low production, low agricultural potential and high production variability. Namentenga Province, on the average, produces 54% of its cereal needs, but last year's harvest met only 38% of local needs.

## CURRENT SITUATION

Following last year's poor harvest, the Government of Burkina (GOB) estimates that 200,000 people are totally without food in the northern provinces. While most donors feel that there is enough stock on hand to cover any cereal shortages in Burkina this year, there is a recognized shortage of cereals in the north, where grain prices have been high. Soum, Oudalan, and Seno provinces (covered by the Système d'Alerte Précoce, SAP) and the northern areas of Yatenga, Bam, Sanmatenga, and Namentenga provinces are all vulnerable to famine. Free food aid has been distributed in all of these provinces.

Donors have encouraged the Government of Burkina (GOB) to release stocks held by the National Cereal Marketing Board (OFNACER) as well as national security stocks held in reserve by the GOB. Although there is cause for concern for the population in the north, actions by the GOB to pre-position and release cereal stocks limit any potential problem.

In April, the United Kingdom Meteorological Office predicted that 1988 would be a very dry year in the Sahel, perhaps among the driest this century. This forecast was based on anomalous Atlantic sea surface temperatures. These anomalies disappeared rapidly in June, eliminating the basis of the forecast. Current rainfall reports, combined with findings that the ITCZ was farther north in July than in any year since 1981, suggest that this forecast has been overtaken by events. There is, however, no guarantee that these good rainfall trends will continue until the end of the season.

## PRE-SEASON ASSESSMENT OF VULNERABILITY TO FAMINE

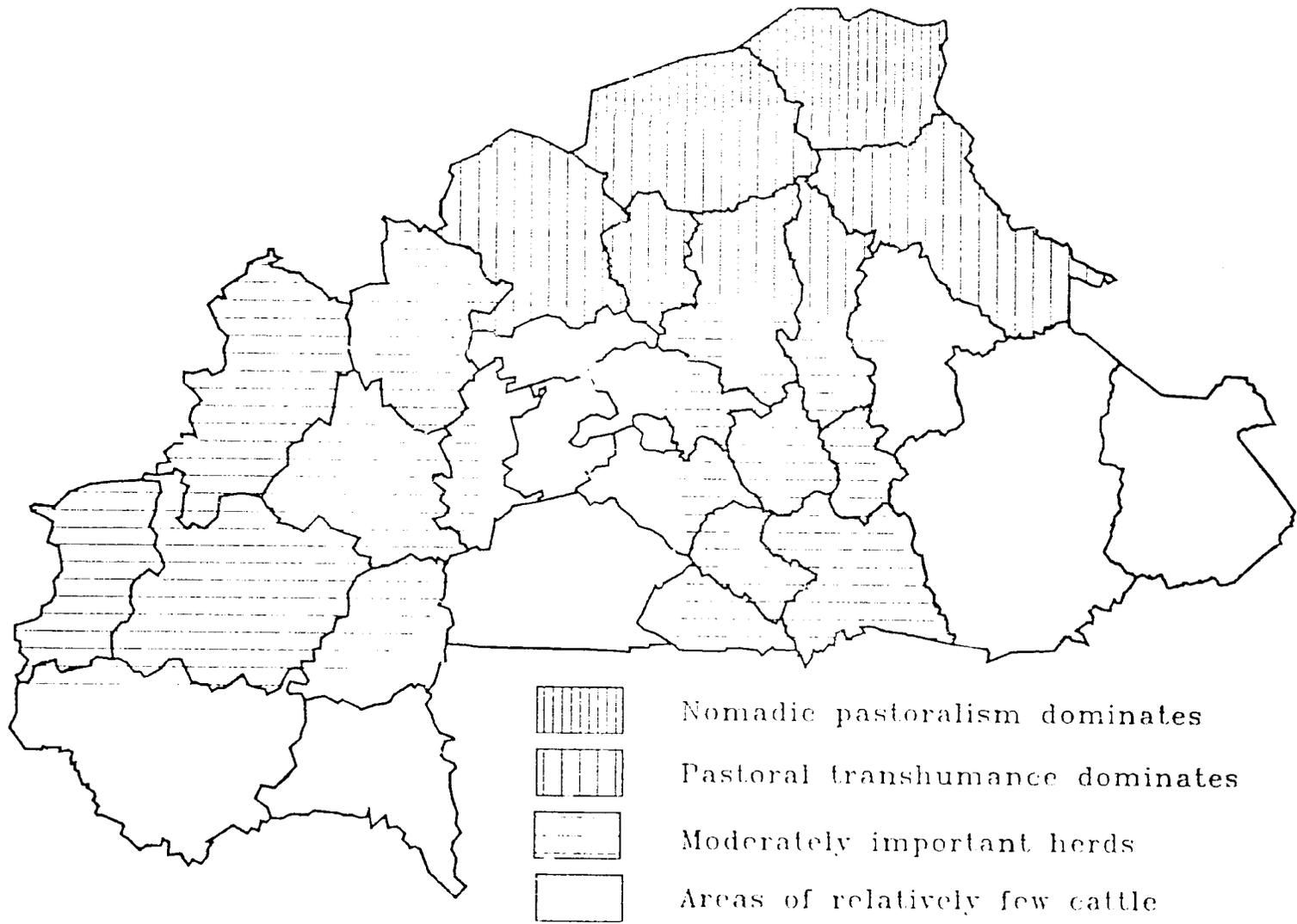
Areas of high vulnerability in Burkina are concentrated in the region generally north of 13° N (see Map 1). The identification of these areas as vulnerable is no surprise. Cereal production is historically inadequate there. Of special concern are the northern Provinces of Soum, Oudalan, and Seno, and the northern departments within the Provinces of Yatenga, Bam, Sanmatenga, and Namentenga. As a result of a poor 1987 harvest, these areas find themselves with poor cereal stocks, high cereal prices, limited other resources, and in need of the food assistance currently being provided. While pastoralism dominates in the northern tier of this area (see Map 2), grain is the primary component of the pastoralist diet. Thus, grain production, prices, and stocks are important in judging vulnerability in these areas.

The purpose of this report is to define the nature and relative degree of pre-rainy season vulnerability to famine in Burkina. Specifically, this assessment will:

- indicate what food security-related data are available for Burkina and the degree of confidence that can be placed in them,
- examine the continuing causes of vulnerability to famine in sub-national areas of Burkina; and,
- describe, within the limitations imposed by the data, the current conditions of food security in these areas and the possible impacts of differing main agricultural season events.

The assessment will first examine and map indicators of current vulnerabilities to famine. Recent manifestations of food shortages will be similarly mapped and compared with the measures to see how they correspond. Finally, the vulnerabilities shown by the indicator, and reinforced by the manifestations of food shortage will be subjectively summed, and greater and lesser degrees of relative vulnerability will be noted by administrative subdivision. Definitions and assumptions used in measuring vulnerability to famine, upon which this assessment is based, are found in Appendix 2.

# Areas of Livestock Production



Source: Atlas Jean Afrique  
FEWS/PWA, June 1988

## Measures of Vulnerability

Historically, the Provinces of Soum, Sezo, Oudalan, Yatenga, Bam, Namentenga, and Sanmatenga have all had relatively low cereal production and a low average level of agricultural potential and variability. These are the areas of Burkina that are presently receiving food aid. Soum, Seno, and Oudalan are presently under the mandate of the donor-funded *Système d'Alerte Précoce (SAP)* and have been identified by that agency as at risk of food shortage. The other four provinces, Yatenga, Bam, Namentenga, and Sanmatenga, are not presently included under SAP's purview, but have been declared by the *GOB* as at risk.

While Burkina's 1987 harvest came close to meeting national cereal needs, production fell short of needs in the primarily pastoral northern provinces of Burkina. Cereal production in these provinces is never sufficient to meet local needs (see Map 3). Local cereal production is supplemented by income from livestock production and the consumption of animal protein in the form of milk products and meat.

Historical production data for Burkina are not available at a level lower than that of the administrative province. Nevertheless, there are important intra-provincial differences in soil type, climatological conditions and other factors that affect grain production. Historical data on agricultural production and adequacy can be supplemented by analyses of satellite imagery of vegetation using the Normalized Difference Vegetation Index or NDVI (see inside back cover). While still the subject of continuing research, NDVI can suggest both the relative agricultural potential and the relative agricultural variability of areas within a region. These measures provide the historical context for current indicators of food shortage.

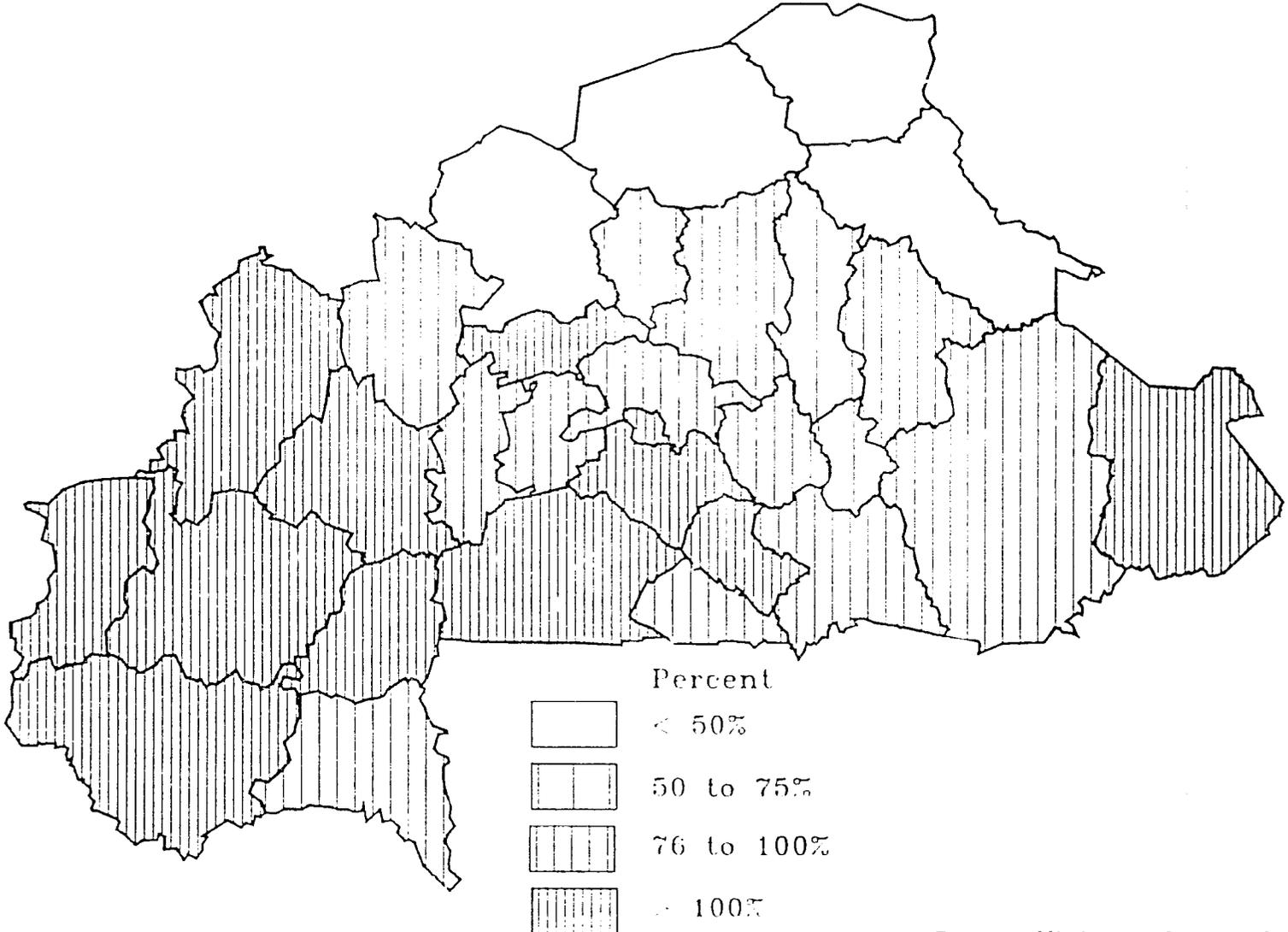
The pattern of average NDVI values over the growing season (July through October) for 1982 to 1987 (see Map 4) confirms that the northern provinces are in areas of low vegetative potential. The areas in the south of Burkina have the greatest agricultural potential within the country.

NDVI levels do not vary greatly from year to year in Burkina as a whole. Most of central Burkina falls in an area of moderate variability. NDVI variability is low in the northern provinces of Burkina. This, combined with the low average NDVI values for those provinces, reinforces the historical analysis of the north as an area of consistently low grain production. The areas of Burkina that have the greatest vegetative variability are in a band across Burkina that generally corresponds to a relatively low average level of NDVI (.2). This band includes most of Burkina's central provinces, in which grain production has been historically low (see Map 3). Those areas of Burkina that have consistently low variability of production and a high level of per capita production are located in areas that have a (relatively) high level of NDVI for Burkina.

The historic dependability and adequacy of the local production process (how production has varied from year to year and the amount of its usual contribution to the population's food needs) can inform and support findings of vulnerability from indicators of the current situation. There are two primary ways of acquiring food, other than producing it oneself: (1) drawing on existing food stocks and (2) purchasing food (using remittances, wages, the proceeds of "cottage industry", gifts, or loans). If these two other sources do not normally cover production deficits, vulnerability to famine will be high.

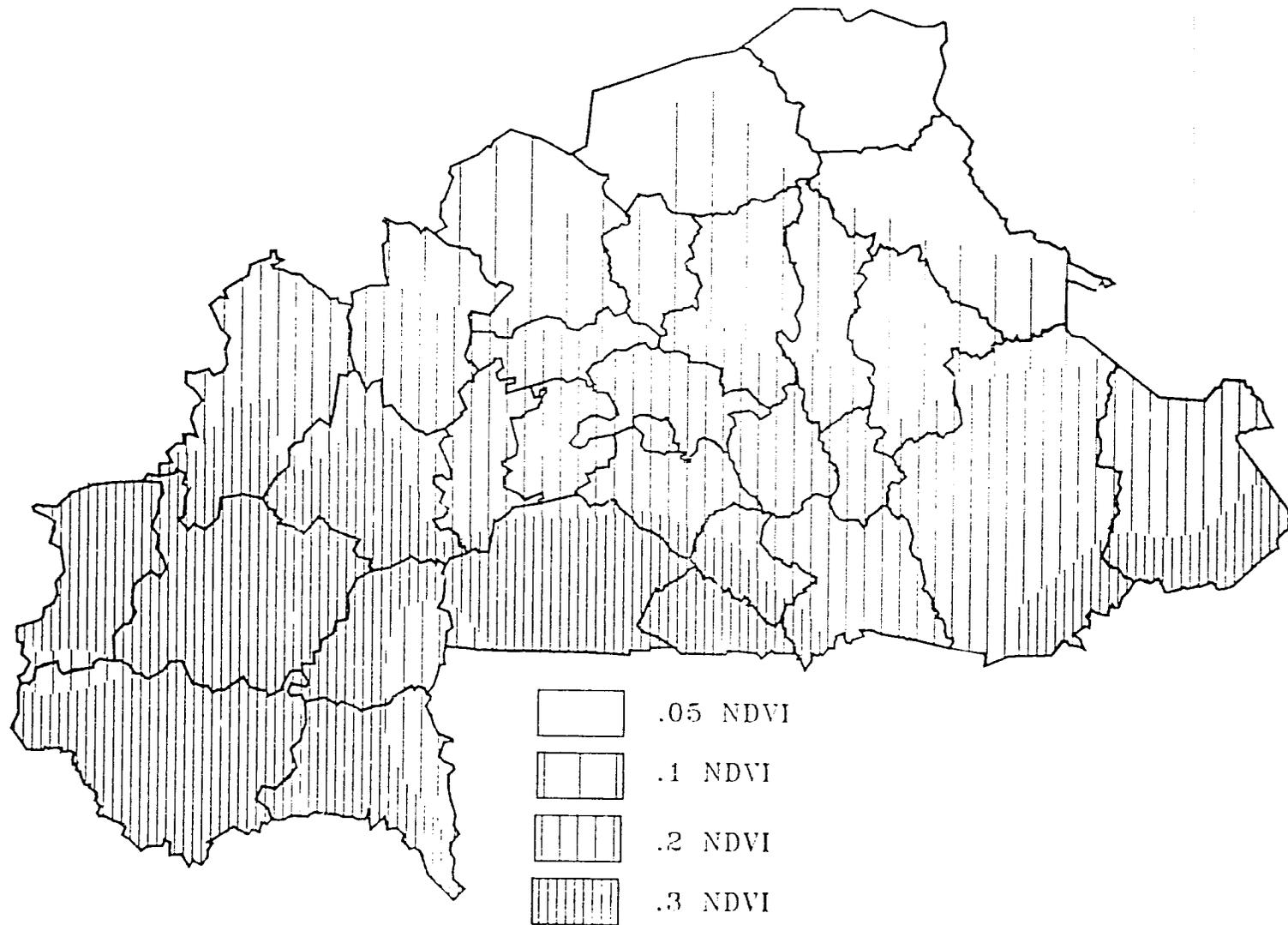
In the absence of satisfactory data on food stock levels, this assessment employs a surrogate measure of stocks. If one assumes all of the 1987 harvest went to stocks and no stocks prior to 1987 were carried over, most of the northern provinces would have had less than seven months of stock on hand following the last harvest.

# Average Needs Met from Local Production 1984 - 1987



Source: Ministry of Agriculture reports  
FEWS/PWA, June 1988

# Average Growing Season NDVI July-October, 1982-1987



## **Adequacy of Agricultural Production**

Defining minimal food needs has always been a problem in the Sahel. Only a limited amount of research has been done to determine the basic needs of peoples in various parts of the Sahel. "Best estimates" of either nutritional or historic (usually cereal) consumption requirements are currently used to determine where food shortages might exist, and what level of assistance is required. Within any country, and Burkina is no exception, there exist several different estimates of cereal requirements.

This assessment uses an estimate similar to that used by USAID/Ouagadougou for annual per capita cereal consumption requirements. Cereals, primarily millet and sorghum, are estimated to constitute 80% of the average diet in Burkina. USAID/Ouagadougou estimates daily consumption of these grains at 16.4 kilograms per person per month or 197 kilograms of milled millet and sorghum per year. Gross production needed to meet food needs is about 15% higher (after accounting for seed, post-harvest losses, and milling losses).

Map 3 shows how well cereal needs were met in each province, on average, from 1984 to 1987. (Agricultural statistics for Burkina are available on a provincial level from 1984 to 1987. Data prior to this period was kept on a different basis and is not comparable.) The general pattern shows southern and eastern provinces either approaching self sufficiency or producing a grain surplus. The Provinces of Namentenga, Oudalan, Seno, Soum and Yatenga consistently failed to approach self-sufficiency during that period. What this assessment does not show are the significant local (sub-provincial) differences in adequacy of production. These variations can be caused by accidents of soil type, topology, climate, or other factors. The larger administrative provinces, particularly those that extend north and south over diverse climatologic zones, as do Sanmatenga, Namentenga, Gnaga and Seno Provinces, are therefore poorly described by provincial-level analysis. Map 4 shows several of the provinces cut by lines representing different levels of average vegetative conditions (NDVI). This intra-provincial variation underscores the limitations of using data aggregated to the provincial level. For example, while the data indicate that there is a low level of production and a low level of production variability in Namentenga Province, this is probably not true for the entire province. The map of average NDVI suggests that southern areas of Namentenga can produce more than the northern areas. In this way, the adequacy of agricultural production varies with the isohyets (higher rainfall levels in the south, lower in the north and east) --with the notable exceptions of areas with flood recession or irrigated agriculture.

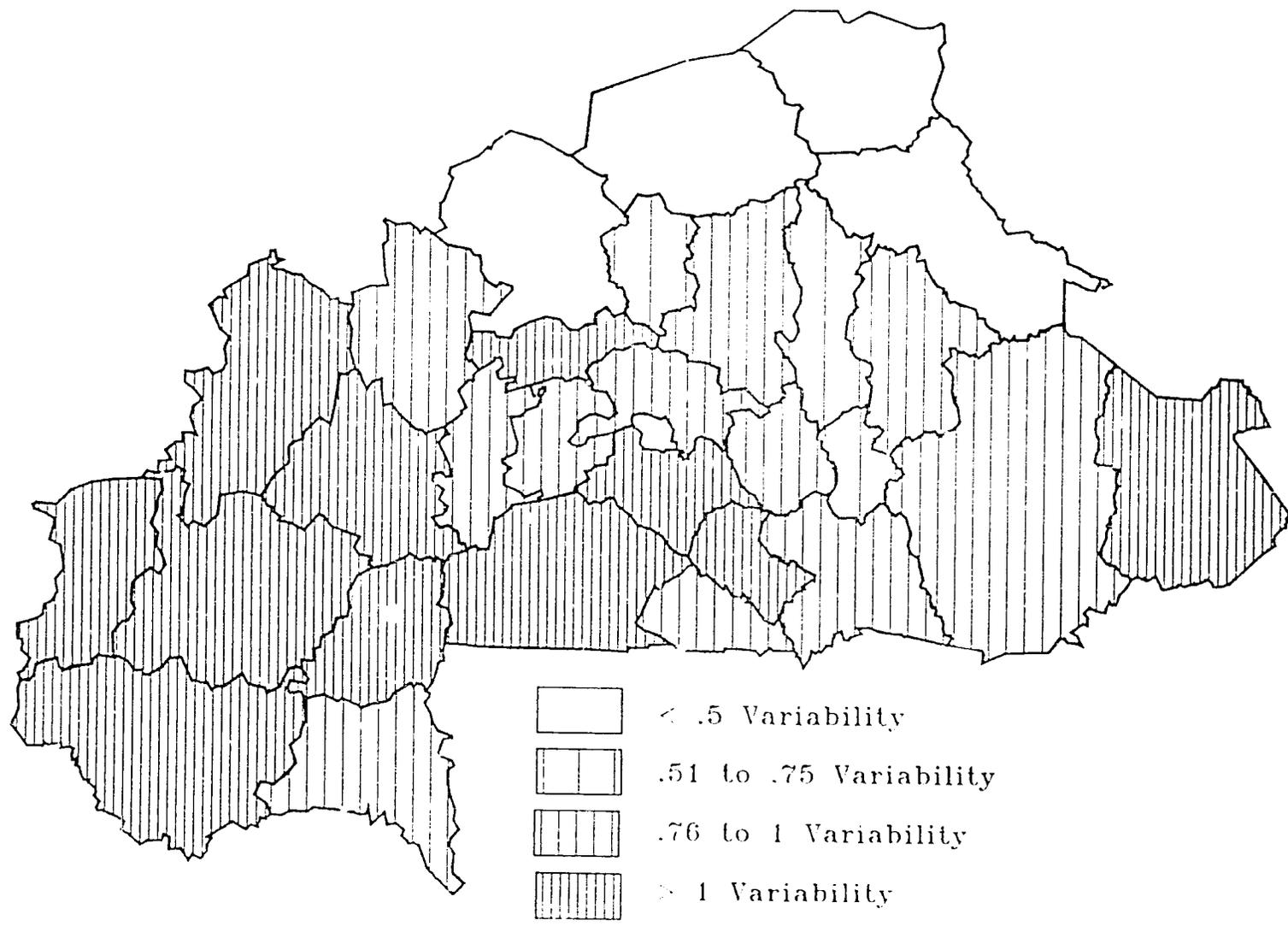
Approximately 20% of the Burkinabé diet is comprised of milk, milk products, meat, legumes, root crops, vegetables and fruit. Production statistics for these non-cereal food items are either not available or not reliable enough to permit measurement of their contribution to the food supply. Nevertheless, their impact on vulnerability to famine must be significant, particularly in times of food stress, when there is an increase in the consumption of wild and gathered foods. The lack of this data is mentioned here to acknowledge its fundamental importance to the assessment, to stress the need for such data, and to qualify the conclusions that will be made in the absence of such information.

## **Variability of Agricultural Production**

Production data from 1984 to 1987 show that variability in production appears linked with latitude (see Map 5). An analysis of vegetation indices derived from satellite imagery (NDVI, see inside back cover) shows that large areas of Burkina have experienced a moderately high level of variability in vegetation from year to year. These areas, located on the Mossi Plateau in central Burkina, have a medium level of production that has been decreasing over the years.

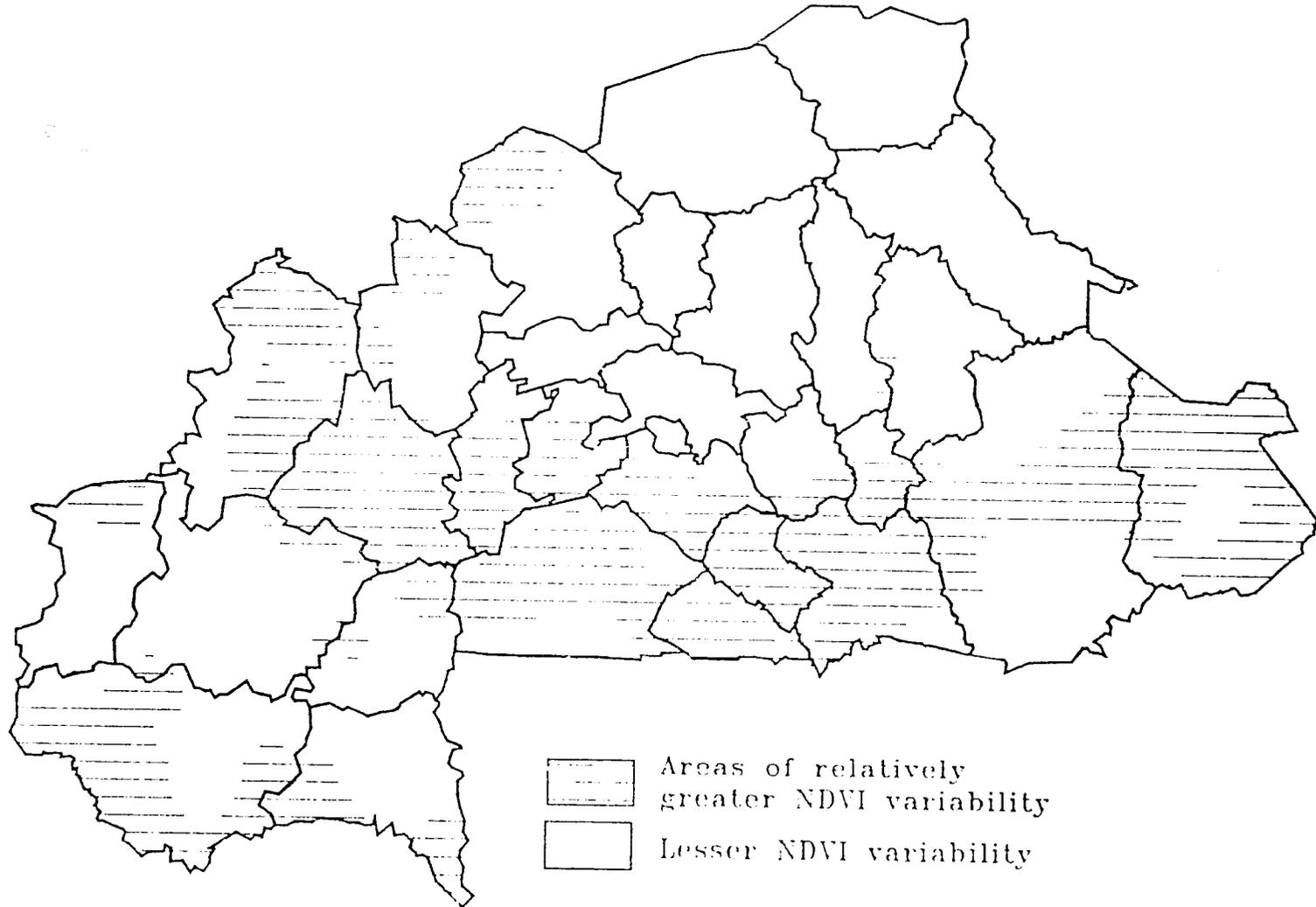
Map 6 shows areas of relatively high vegetative variability in Burkina (as measured by variability of NDVI). NDVI in these areas varied moderately from year to year (1982-1987 during the period July 1 -

# Variability of Production 1984 to 1987



Source: Ministry of Agriculture reports  
FEWS/PWA, June 1988

# Growing Season NDVI Variability July-October, 1982-1987



October 31). Maps 7 and 8 provide the regional context for average NDVI levels and NDVI variability. NDVI is a measure of photosynthetic activity and is not a measure of crop production. The conditions favorable for vegetation, however, will also favor crop growth. Therefore it is possible to infer from the NDVI how vigorously crops might respond. Map 6 shows the extent to which NDVI (and presumably economically important grasses and crops) has varied historically in the different parts of the country. Moderately high variability extends across Burkina and is especially apparent in central Burkina. This area is an important agricultural zone.

Interannual variability of agricultural production is characteristic of transitional climatic areas like the Sahel. Rain forests and deserts usually receive predictable amounts of rain and usually present the same, predictable opportunities for agriculture each year. In the Sahel, however, the northern limit of rainfall may advance in some years, and never arrive in others. A farmer's fortunes rise and fall upon the northward progression of the rainy season. This significant variability in production is an important factor in an understanding of Sahelian vulnerability.

Map 5 displays the location and range of variability (maximum minus minimum production divided by the average) of agriculture in each of Burkina's provinces. The range of production between 1984 and 1987 extends from a low of 765 MT in Nahouri Province in 1984, to a high of 133,895 MT in Houet Province in 1986 (ignoring the generally pastoral economy of the northern provinces). Agricultural production has generally increased on a gradient sloping to the south and slightly favoring the west. Agricultural variability probably differs considerably within provinces, especially those oriented north-south, such as Kossi, Sourou, Namentenga, Gnagna and Gourma.

Analysis of cereal production data from 1984 to 1987 shows that regions where production did not meet local needs are located in areas of low NDVI variability north of 13° N (see Map 6). The predominance of pastoralism in these areas is consistent with this combination of characteristics. Since data on the historical variability of cereal production are aggregated by province and do not reflect sub-provincial differences, NDVI provides a useful indicator of such intra-provincial variations. Map 9 outlines areas of medium NDVI variability and low to medium average NDVI. Some northern areas within provinces of high production are subject to medium NDVI variability. This pattern is evident in parts of Kossi, Mou Houn, Sissili, Bazega, Zoundweogo, and Tapoa provinces. As shown in Map 10, the areas subject to medium NDVI variability represent a broad range of average per capita production levels. Many factors could account for this broad range.

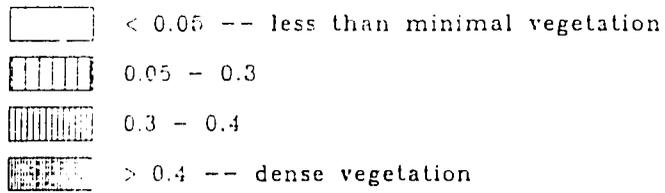
Map 11 shows, for each province, per capita production and the relative variability of production. As shown, six of the seven northern provinces currently receiving food aid have both low per capita production and low production variability. Sanmatenga Province appears to have higher per capita production, but yields probably vary greatly between the northern and southern areas of that province.

### Food Stocks Currently Available

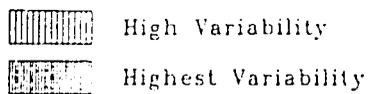
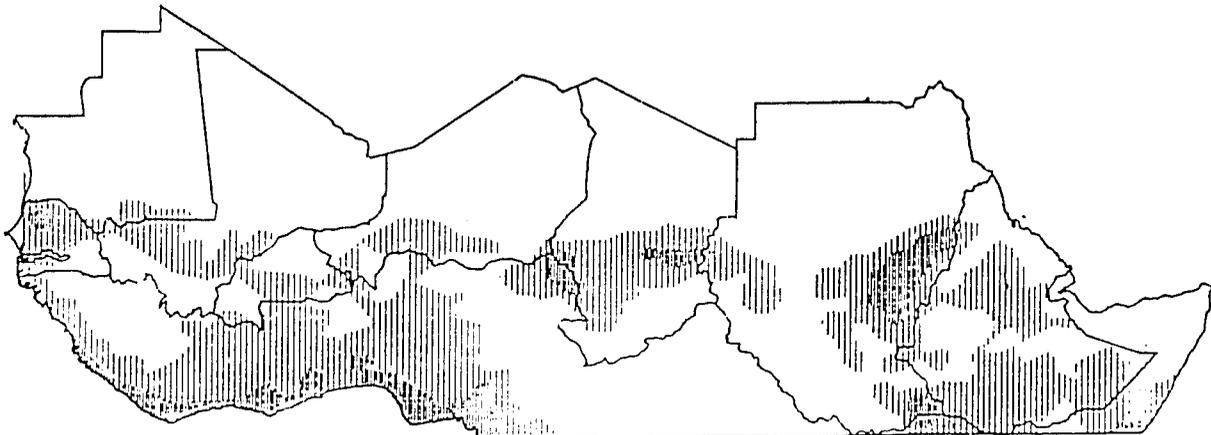
The level of current food stocks is a critical measure for pre-rainy season vulnerability analysis. In most of the Sahel, the pre-harvest period is usually that of the lowest food reserves. A perfect vulnerability assessment would be able to measure (1) household stocks, (2) commercial stocks held by traders, and (3) public stocks available for distribution. An accurate judgement might then be made about the actual and potential role food stocks play in current vulnerability to famine.

In Burkina, as elsewhere in the Sahel, reality is less kind. Little reliable information is available for household stock levels in any year or any area. The same is true for commercial stocks, since Burkinabé grain merchants and their stocks have played an important role in trade and politics. Public stocks held by the National Marketing Board (OFNACER), which constitute the smallest of the three categories, can be estimated with some accuracy. In the absence of data on commercial and household

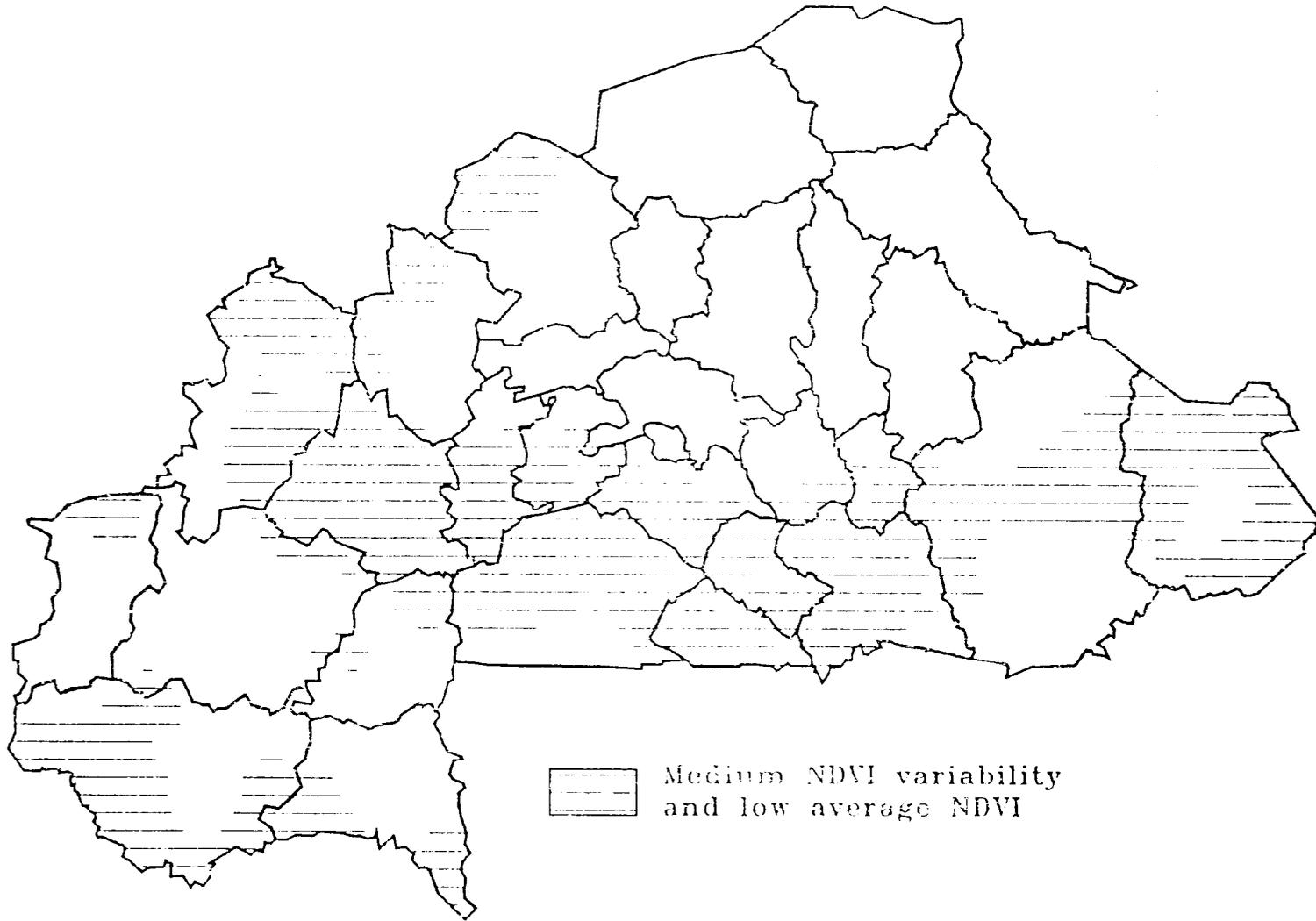
### Average Growing Season NDVI Based on Indices for 1982--1987



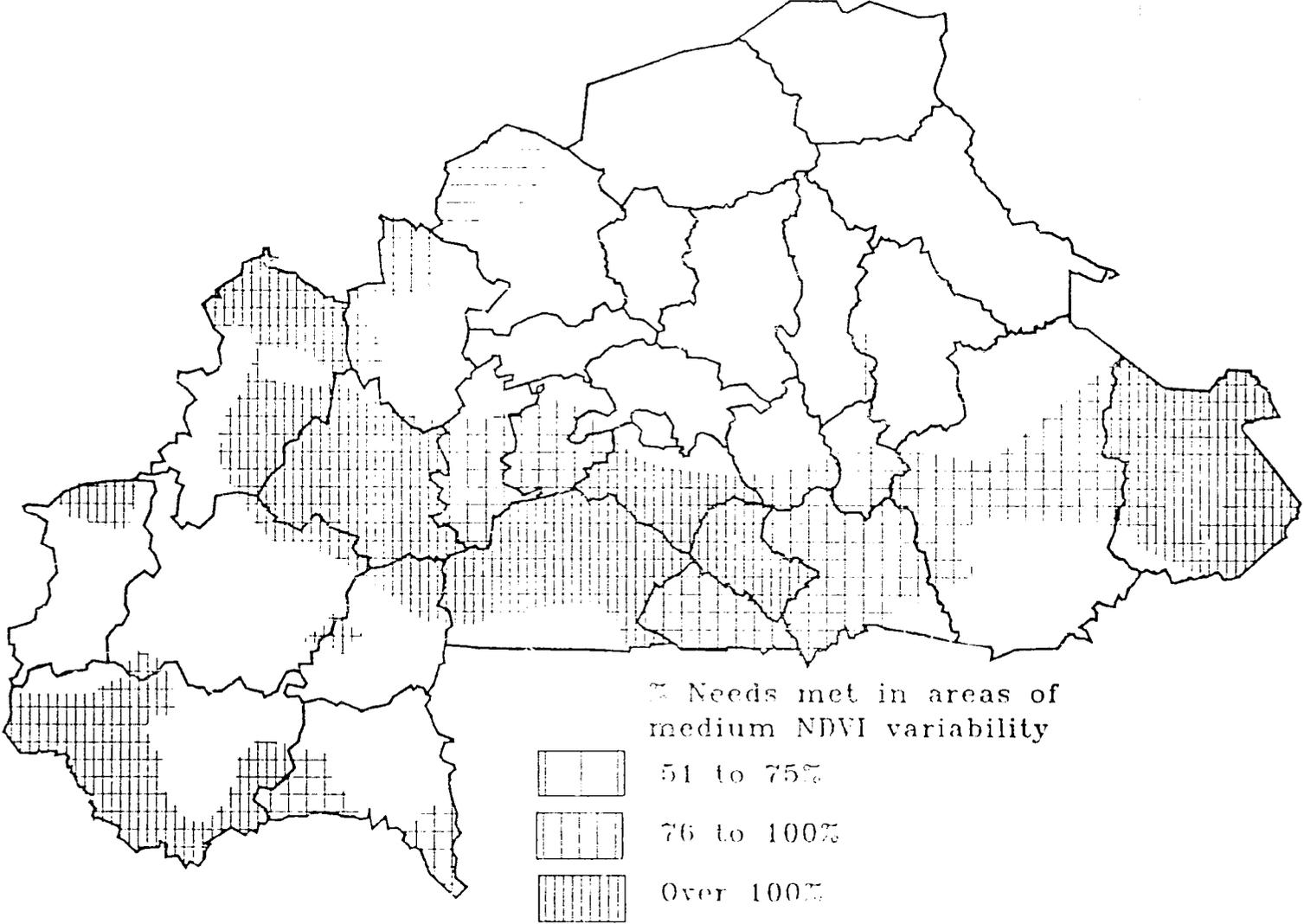
### Variability of Growing Season NDVI 1982 to 1987



# Areas of Medium NDVI Variability and Low Average NDVI

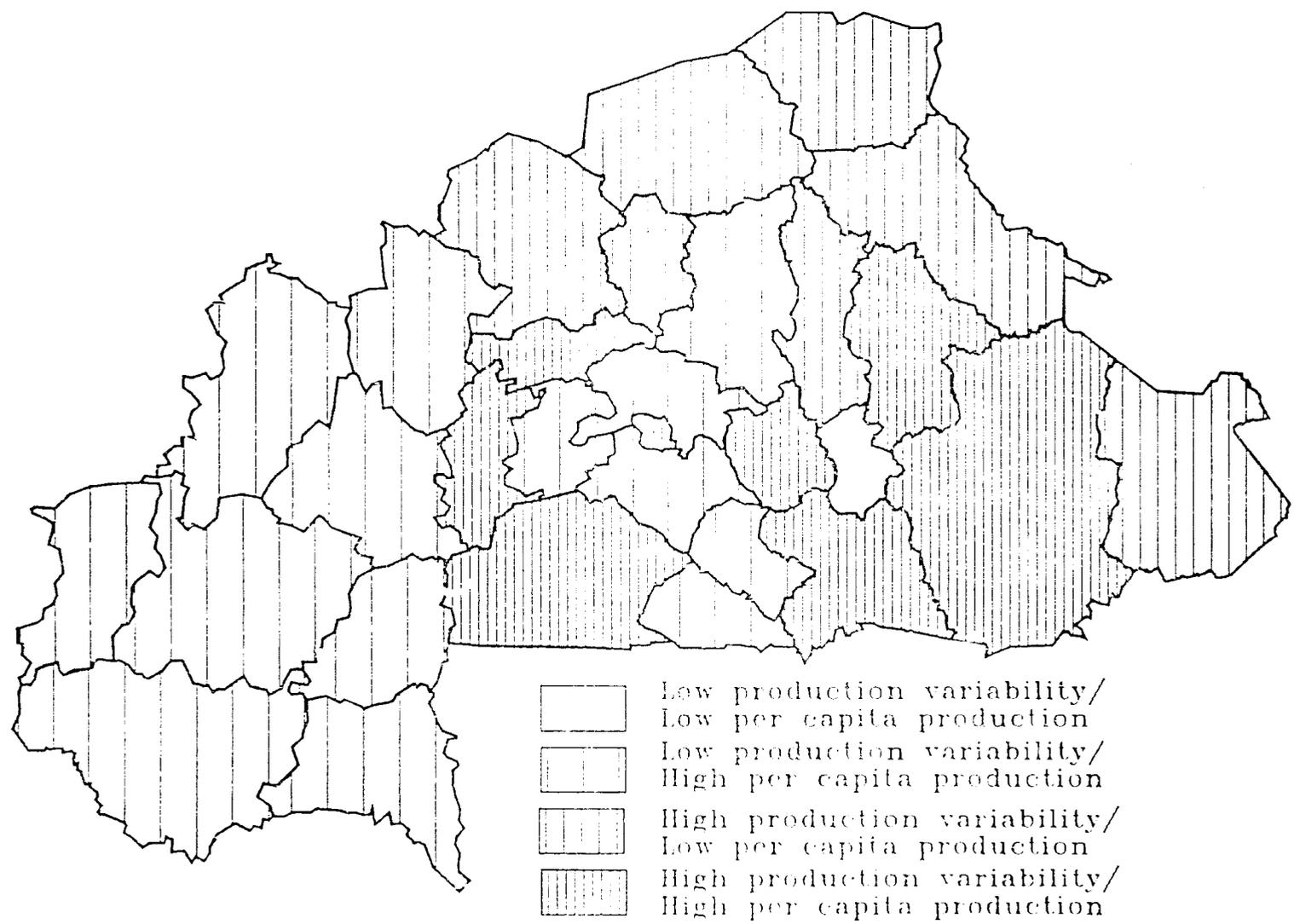


# Production Adequacy in Areas of Medium NDVI Variability



Source: Ministry of Agriculture reports FEWS/PWA, June 1988

# Production Variability and Per Capita Production



Source: Burkina Agriculture reports  
FEWS/PWA, June 1998

stocks, however, one must seek surrogate measures that can establish possible ranges of stock quantities, and thus allow a broad understanding of the current situation. Production in 1987 can be used as such a surrogate under the assumption that previous stocks had been depleted.

Map 12 locates areas where food stocks from the 1987 harvest are probably already depleted. It shows that 1987 stocks would run out (if consumed at the rate of 16.4 kg/person/month) before the 1988 harvest in the provinces generally on or above the line delineating the .05 level of NDVI (see Map 4). An exception exists in the provinces of Namentenga and Sanmatenga, which extend south of that line.

Map 3 shows where shortfalls of 31 to 76% of requirements were found (6 of Burkina's provinces). The most important shortfalls are in Oudalan, Soum, Seno and Yatenga provinces, where less than 50% of local needs could be met through local production. These provinces are largely dependent on pastoralism, and so this data should be used with caution. But, if this analysis is correct and the assumption is held that no stocks were brought over from previous years (and the rate of consumption is held constant), no grain stocks from local production currently exist in Oudalan, Soum, Seno and Yatenga Provinces. In these areas, either consumption has already been reduced below minimally acceptable rates, or other food acquisition mechanisms have had to be used, where available.

Public distributions of emergency food assistance are occurring. They are limited in quantity and should do little to change vulnerability. The current availability of security and OFNACER stock in the northern provinces is shown in Table 1. Commercial stocks are, of course, only available for purchase. Their presence, were one able to accurately measure the amount held in each area, would therefore not necessarily translate into increased consumption and lessened vulnerability. Whether sufficient purchasing power exists this year in many deficit production areas is very much an unresolved issue.

#### Availability of Other Resources

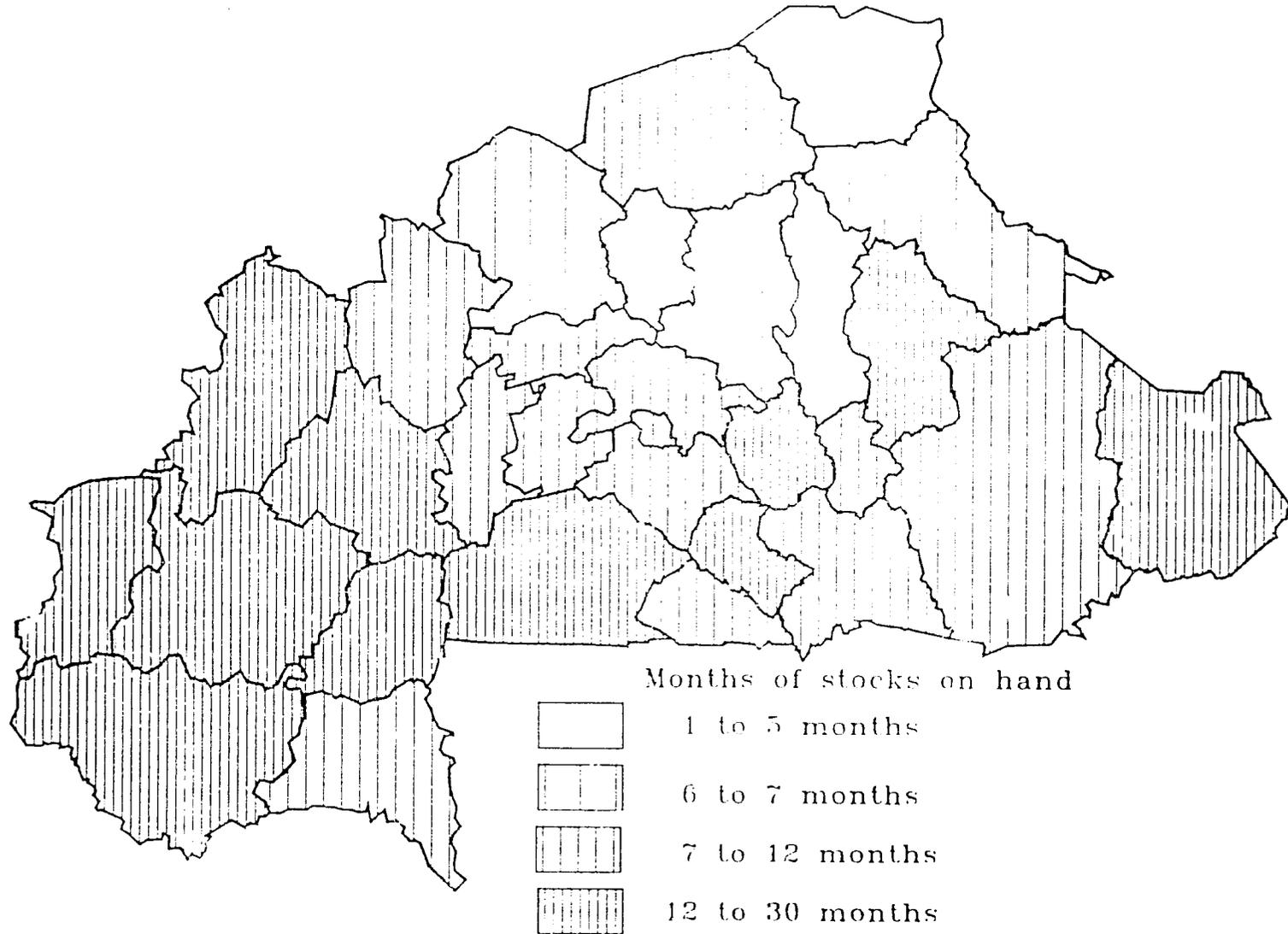
There are no data available that will give an accurate picture of the other resources available to Burkinabé to cover food needs during periods of stress. Nevertheless, it is clear that non-farm economic activities play an important role in food acquisition.

Government employees, many urban residents, military, police, and a small group of private sector employees, all largely purchase or trade for much of their food supplies. Many, if not most, rural farmers also rely upon migrant remittances. The Mossi, inhabitants of the southern tier identified as vulnerable, migrate freely and migration and remittances must play an important role in their drought-coping strategies.

There is no restriction on migration by Burkinabé to Cote D'Ivoire, an important factor in assessing vulnerability. Migration, gifts, and non-farm economic activities (traditional crafts, small shops) also supplement the people's own agricultural production. Women play an important role in these activities, providing services, selling home-made or processed goods, gathering wild food, running small retail businesses and actively participating in the market economy. During the worst of times, people might use any or many of these strategies to provide for themselves and their households.

Non-farm economic activity is the element of the food acquisition process about which there are the least data. Such data as exist are largely the result of a limited number of surveys, difficult to extrapolate to other areas. These surveys suggest that even rural agriculturalists may receive an important percentage of their total income from non-farm economic activity.

# Months of Stocks on Hand from 1987 Harvest By Province Assuming all Stocks Prior to 1987 Exhausted



Source: Ministry of Agriculture reports  
FEWS/PWA, June 1988

Consumption rate established at 197 kl per person

**Table 1 Location and Amount of OFNACER and Security Stocks**

<b>Location Of Stocks</b>	<b>1987 Grain Production</b>	<b>Percent Of Needs/ Grain Prod</b>	<b>MT Per Person All Stocks</b>	<b>MT Per Person Grain Prod</b>	<b>Public Stocks As Percent Of Total</b>	<b>Kg Increase By Public Stocks</b>
Dori	24869.3	0.35	0.077	0.069	0.097	0.007
Ouahigouya	78268.85	0.53	0.107	0.104	0.025	0.003
Kaya	65560.5	0.44	0.136	0.086	0.367	0.050
Koudougou	239423.75	1.40	0.276	0.275	0.002	0.001
Bobo	198768.25	1.56	0.310	0.307	0.009	0.003
Dedougou	243954.25	1.30	0.261	0.256	0.018	0.005
Gaoua	84084.55	0.90	0.179	0.177	0.011	0.002
Koupela	173820.75	0.87	0.172	0.172	0.003	0.001
Fada	164270.15	1.13	0.224	0.223	0.004	0.001
Ouaga	121000.05	0.80	0.172	0.157	0.086	0.015

It is not yet possible to quantify the impact of labor migration or other aspects of alternative income production on the vulnerability of any areas in this analysis. For example, agricultural production has been declining on the Mossi Plateau, but people in the area have long labor migration as a strategy to meet subsistence needs.

## MANIFESTATIONS OF VULNERABILITY

The consequences of food shortages should be manifest in various physical, social, and economic indicators. These indicators differ from the three used to define vulnerability, in that they do not measure the shortage of food, but rather some of the consequences of it. In this sense, they may help to confirm or deny degrees of vulnerability. The difficulty in using these indicators for confirmation of food shortages is that they usually reflect much more complex conditions than simply the scarcity of food. Particularly well-known indicators of this type include malnutrition levels and food price anomalies.

High cereal prices throughout northern Burkina (see Figure 1), as well as emergency food distributions in areas judged to be at risk, make it clear that many areas of Burkina are presently under stress. These manifestations of food shortages correspond to areas identified by SAP.

### Malnutrition

There are no recent data available for Burkina that allow us to judge the present nutritional status of the population. However various sources of data exist, collected by Catholic Relief Services and local Child Nutritional Centers. These data are not internally comparable because of varying methodologies and they do not contribute to a complete picture of the nutritional status of children in Burkina.

### Millet Prices

Millet prices collected by SAP in the northern provinces indicate a rise in prices where stocks are said to be poor and in areas targeted for emergency food. Figure 2 shows the historical evolution of millet and sorghum prices in Ouagadougou from 1984 to the present. Following the poor 1984 harvest, the price of grain increased sharply (see Figure 1). While the current rise in prices seems appropriate for this time of year, grain prices in Ouagadougou might not reflect the experience in rural areas

### People At-Risk

The Système d'Alerte Précoce (SAP) in Burkina tries to identify the number and location of people that require emergency food assistance. The SAP has estimated the number of persons at risk in the northern provinces at 200,000. SAP monitors these provinces using data on agricultural production, migration, livestock production, market prices, health and nutrition indicators (when available), and food stock reserves. Map 1 shows vulnerable areas recommended for food assistance. The population in these areas totals 1,500,000. Those actually requiring and receiving food assistance are a small subset of the total population.

### Unusual Migrations

Migrations of rural people in the north to gold mining areas has been considered important. It appears, however, that households may be selecting individuals that can be spared to seek their fortunes mining gold. There is no way to judge the impact this has at a local level. The mines owned by the GOB will be closed at the start of the planting season to encourage rural prospectors to return to their farms and participate in the agricultural season.

Figure 1

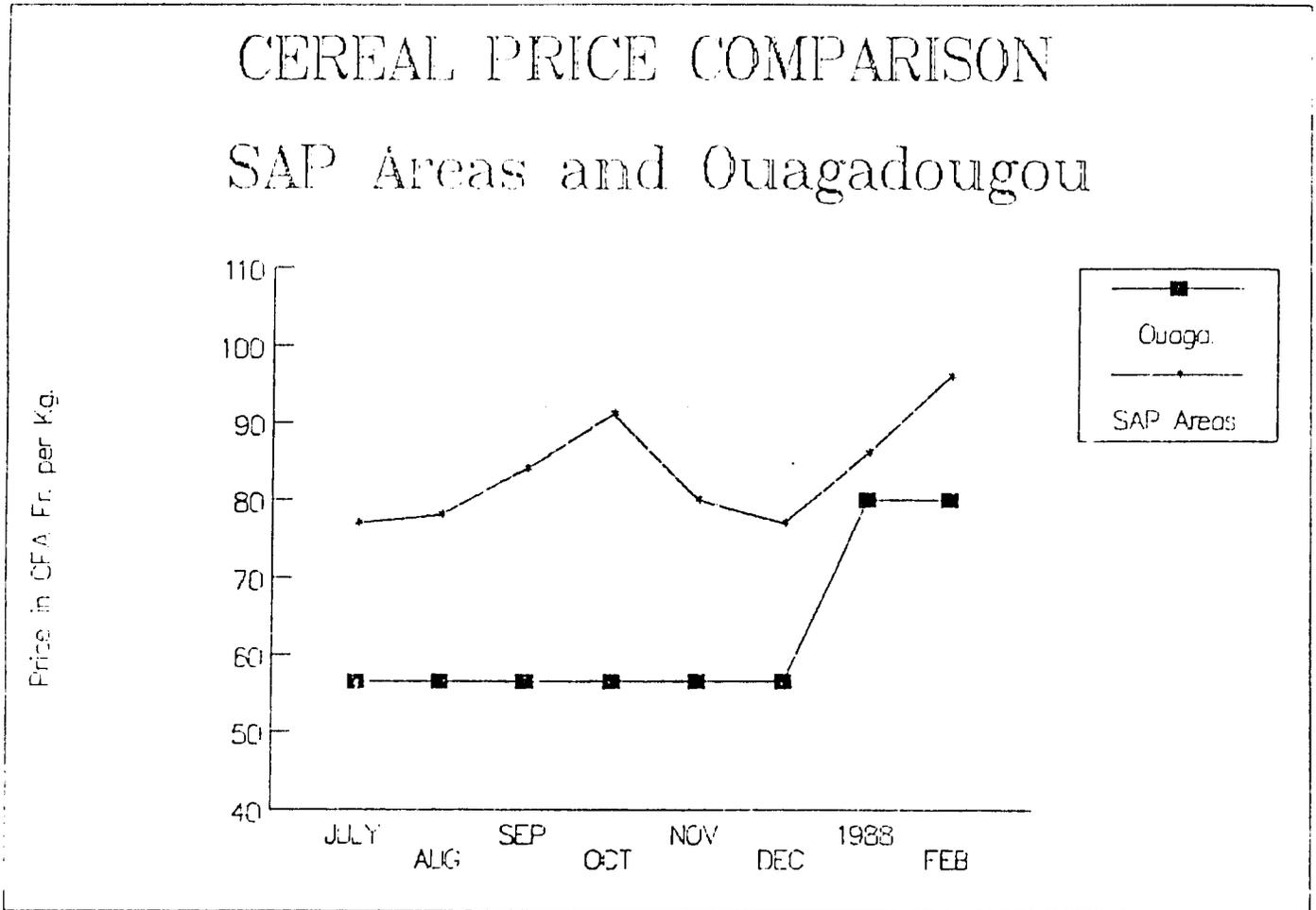
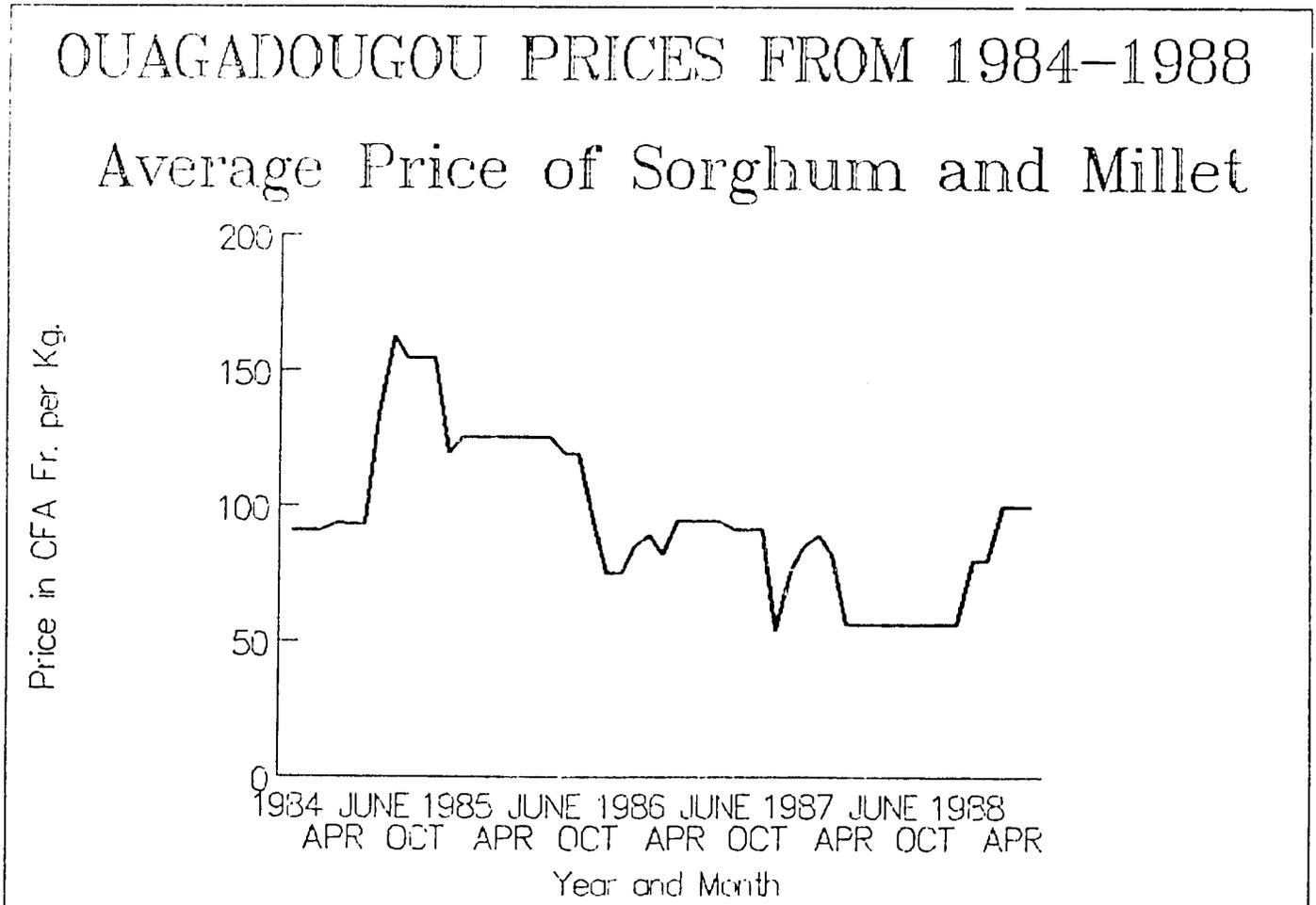


Figure 2



## RELATIVE VULNERABILITY TO FAMINE

Cereal prices, SAP assessments of risk, and imputed stocks, informed by historical views of production and vegetation, produce a picture of vulnerability in northern Burkina. Current efforts to provide relief aid in these areas should help mitigate this vulnerability.

### Areas of High, Continuing Vulnerability

- Oudalan Province is traditionally an area of low production, low average NDVI, and high production variability. The province has usually been able to produce 31% of its grain needs. Last year's harvest met only 20% of area needs and locally produced stocks are inadequate. OFNACER stocks stored in Dori for Oudalan are exhausted. Millet prices are high.
- Soum Province has been an area of low production, low average NDVI, and high production variability. Soum, on average, produces 48% of its cereal needs. Last year's harvest will only satisfy 28% of needs and locally produced stocks are also inadequate there. OFNACER and security stocks remain. Millet prices are high.
- Seno Province has been an area of low production, low average NDVI, and high production variability. Seno, on average, produced 43% of its cereal needs. Last year's harvest was approximately 5% lower and locally produced stocks are inadequate. OFNACER stocks stored in Dori for Seno are exhausted. Millet prices are high.
- Yatenga Province has been an area of low production, low average NDVI, and high production variability. Yatenga, on average, produces 45% of its cereal needs. Last year's harvest produced 48% of the province's needs. Nonetheless, locally produced stocks are inadequate. OFNACER and security stocks remain. Millet prices are high.
- Bam Province has been an area of low production, low average NDVI, and high production variability. Bam Province, on the average, produced 74% of its cereal needs. Last year's harvest met only 32% of its needs and locally produced stocks are inadequate. OFNACER stocks remain. Millet prices are high.
- The northern part of Sanmatenga Province (the most vulnerable part of the province) has been an area of low production, low average NDVI, and high production variability. Sanmatenga, on average, produced 76% of its cereal needs. Last year's harvest met only 52% of needs. Locally produced stocks are probably inadequate in the north. OFNACER stocks remain. Millet prices are high.
- The northern part of Namentenga Province (the part most vulnerable) has been an area of low production, low average NDVI, and high production variability. Namentenga, on the average, produced 54% of its cereal needs but last year's harvest met only 38% of needs. Locally produced stocks are probably inadequate in the north. OFNACER stocks remain. Millet prices are high.

## APPENDICES

# Administrative Units



## Appendix 2

### Model Used for Vulnerability to Famine

Over the centuries there have been many descriptions of famine. Evocative though they are, most poorly describe the complexity of the conditions that lead to that state. The concept of measuring a population's vulnerability to famine is a newer one, still without a generally-accepted methodology. Early warning systems, particularly those dealing with Africa, have begun to search for a set, or sets, of indicators of pre-famine conditions. FEWS assessments of vulnerability to famine form part of a continuing effort by USAID to identify incipient famine conditions, and to define important features of that process (the number of people involved, their location, and the nature of the problem). The mandate of the Famine Early Warning System is to provide an operational analysis of immediate use to decision-makers. The methodology used in this type of environment will continue to evolve.

#### Definitions of Famine and Vulnerability

- Famine is a sustained period during which large numbers of people consume less food than they require, giving rise to harmful physical and social consequences.
- Vulnerability to famine is the degree to which the available food, from any source, does not meet a population's requirements over a period of time. Highly vulnerable populations (those "at risk" of famine) currently are, or soon will be, unable to meet their food needs during a sustained period of time. This will result in substantial harm to individuals and their society. Other, less vulnerable populations either currently appear to be meeting their minimal requirements, or are likely to fall below minimal levels for a limited period of time (i.e., they may experience a food shortage, which may also cause harmful physical and social consequences). In the Sahel, virtually all rural populations are "vulnerable" to some degree.

#### General and Site-Specific Vulnerability Assessment

At the most general level, access to food can be described in the same terms everywhere. Food is made available by:

- (1) producing it (agriculture, herding, fishing, etc.) and
- (2) acquiring it by other means (purchase, gift, trade).

An assessment of any population's current vulnerability to famine requires a measurement of the current condition and/or performance of these two basic processes. Famines do not usually occur without a preceding period in which coping mechanisms are derived and used, and resources to avoid famine are gradually exhausted. An historical context that describes recurring causes of food shortage, recent food reserves, and the intensity of use of coping mechanisms, is required to give a perspective on the significance of current conditions.

In each place, the relative degree of dependence upon either of the individual processes is determined by a host of local environmental, social, and economic opportunities. The operation and performance of the two processes are site-specific, and can only be measured accurately in the context of their many interactions. There is also a site-specific temporal dimension as an assessment of vulnerability to famine must be sensitive to the season in which it is made. The available food supply, particularly in agricultural areas, will be highly dependent upon proximity to the harvest(s).

## Methodology of the Burkina Vulnerability Assessment

The FEWS assessment of vulnerability to famine in Burkina attempts to identify both the recurring characteristics of food shortage and current relative levels of vulnerability to famine by answering four questions.

- What are the levels of current food stocks (from local production or elsewhere)?
- What other food acquisition resources are currently available?
- Based on the past, what is the likelihood that a "normal" food production process will occur, and what is the quantity of food it may produce?
- Based on the past, what other opportunities are normally available for acquiring food?

The first two questions establish the presence or absence of food, and determine the level of current vulnerability to famine. Some indicators that might be examined in order to respond to these questions include surveys of household stocks, agrometeorological reports of progress in planting, inventories of public food assistance stocks, and reports of work-related migrations. This type of data is frequently difficult to compile or is simply not available. In that case, one may have to seek less direct, surrogate, measures of this information. The last two questions help to establish the inherent strengths and weaknesses of site-specific food production capabilities and food acquisition opportunities. They also provide a context against which to measure the significance and possible impact of actual food reserves and food acquisition opportunities that are currently being employed.

Examining the varying pictures of relative vulnerability that are produced by each indicator, a ranking of their significance is then necessary. The weights assigned to indicators at this point are necessarily subjectively determined. Finally, regions of relative vulnerability are built based on the convergence of indicators examined.

A final step is then to compare areas currently revealing signs of stress on the food supply (food prices, malnutrition surveys, etc.) with the areas judged to be currently vulnerable, to see whether or not the judgements are confirmed. Indicators of "revealed stress," such as these, are notoriously difficult to relate to present food supply. Typically, they tend to be "late" or very indirect indicators of the amount of food available and have to be used cautiously in this sense.

### Restrictions of Data

Most of the data available for Burkina are collected down to the level of the region, which is the geographic level of this analysis. Compared to other Sahelian countries, the geographic resolution of this data is normal, but still difficult to use successfully to describe other than very broad patterns that often relate very poorly to sub-regional conditions. Much of the data required for an assessment of vulnerability to famine in Burkina is either lacking, or of insufficient quality to be used with confidence. The FEWS principle of using a convergence of evidence (comparison of many flawed indicators that, nevertheless, sometimes show a consistent and intuitively meaningful pattern) is intended to pick up the "signals in the noise", reflections of reality that emerge, despite problems of data quality and inadequate resolution of data.

## Appendix 3

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## 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.

**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.

## FEWS Publication Schedule

### Country Reports

FEWS Country Reports will be published monthly during the growing season and bimonthly during the rest of the year. A preliminary harvest assessment issue will be published toward the end of the growing season for each country.

GC - General Coverage

GS - Growing Season Monitoring

PHA - Preliminary Harvest Assessment

	Jul	Aug	Sep	Oct
Mauritania	GS	GS	GS	PHA
Mali	GS	GS	GS	PHA
Burkina	GS	GS	GS	PHA
Niger	GS	GS	GS	PHA
Chad	GS	GS	GS	PHA
Ethiopia	GS	GS	GS	PHA
Sudan	GS	GS	GS	PHA
Mozambique		GC		GC

### Bulletins

FEWS Bulletins are published every ten days during the Sahelian and East African growing season. Twelve Bulletins [\*] are published annually starting with the 20th of June.

FEWS Bulletins Sahel & East Africa	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	**	***	***	***	*		