FAMINE EARLY WARNING SYSTEM
(FEWS)

PROJECT PAPER

(698-0466)

Approved: September 28.1988

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

SEP 27 1988

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM: AFR/TR, Keith W. Sherper KS

SUBJECT: Famine Early Warning System (698-0466) Project Authorization

PROBLEM: Your approval is required to authorize a four year $9 million Famine Early Warning System (FEWS) project. This project funding will consist of $6 million core funding for AID/W and $3 million buy-in for USAID's. All of this funding is from the Development Fund for Africa (DFA) appropriations account.

DISCUSSION:

I. Background

FEWS was originally started in mid-1985 under crisis conditions to respond to USG needs for better information about famine-affected populations. U.S. responses to specific crises had been severely hampered because not enough information was available on populations in disaster areas, the causes of the famine, or food production and stocks. Thus, the first objective of FEWS was to identify conditions which might lead to a famine emergency and to target populations at risk at a sub-country level. Its orientation was toward United States decision makers and its purpose was to provide them with sufficient, timely and credible information. The initial activity was supported with Foreign Disaster Assistance funding. Later FEWS activities were funded through the Africa Emergency Locust/Grasshopper Assistance Project which was amended on April 3, 1987 to continue FEWS activities. This new FEWS project is a follow-on to those earlier activities.

A clear lesson from the mid-1984 famine is that, "not only must the warning be as early as possible, but there must be agreement between donors and host governments on the nature and extent of the problem and the kind and quantity of external assistance needed." This is an enormous task and setting up a permanent early warning system is a long term effort.

The purpose of the FEWS Project is to help establish a famine early warning system that provides timely information so that decision makers can authorize famine prevention initiatives.

This purpose is to be achieved by providing technical assistance, training, computer hardware and software, communications facilities, acquisition of data sets and special studies.

Carrying out the project purpose requires addressing three interrelated needs:

-- A.I.D.'s internal need for a famine early warning capability within the concerned A.I.D. organizations;

-- Host country needs to create or reinforce national early warning systems; and

-- The international community's need to collaborate on the evolution of an acceptable early warning methodology.

To more adequately address these needs, there was consensus at the ECPR with the Project Paper strategy to shift more analysis to the USAID level. Furthermore, it was agreed that the $6 million level set at the PID ECPR was not adequate to accomplish this task. The ECPR agreed to the $3 million Mission buy-in to the budget to better accomplish the shifting of analysis to the USAID level. This optional mission buy-in budget will help assure that staff in the field can carry out the tasks outlined in the Project Paper. This is particularly true for the important task of assisting host governments in strengthening their early warning capabilities.

Another issue discussed at length at the ECPR was that because Ethiopia is under Brooke/Alexander Amendment prohibitions, these DFA funded FEWS Project activities may not be carried out to provide assistance to Ethiopia. Thus, the ECPR concluded that a FEWS field representative should not be assigned to Ethiopia. However, given the high level of disaster assistance to Ethiopia in the past, the Director of the Office of Foreign Disaster Assistance agreed to use Foreign Disaster Assistance funds for a contractor staff person to monitor information obtained from remote sensing, USAID staff in the field and international early warning efforts.

II. Financial Summary

The LOP for this Project is $9 million. This consists of $6 million core funding and $3 million for mission buy-ins. The primary implementation contract is covered by the $6 million core funding. The first year obligation is to be $2 million.

b

Estimated Budget
($000)

Cost Element	Year 1	Year 2	Year 3	LOP
Technical Assistance	2,570	2,570	2,560	7,700
Institutional Support	330	330	340	1,000
Training	100	100	100	300
TOTAL	3,000	3,000	3,000	9,000

III. Project Analyses

The Project has been reviewed and found feasible based on the various analyses conducted in the project design.

This Project meets the criteria for Categorical Exclusion in accordance with Section 216.2(c)(2)(i) (iii) (v) (vii) and (xiv). See Annex G of the project paper.

As noted in section III.C.2.b. of the Project Paper, no capital investment is anticipated under the FEWS activity so that FAA Section 611(e) does not apply.

IV. Implementation Plan

The FEWS will operate at three integrated levels: 1) the Missions, 2) AID/W and 3) a USG processing facility. Since USAID officials are required to be knowledgeable about the "in-country terrain," their experiences and views are particularly pertinent. Consequently, data analysis will be the responsibility of USAID mission offices. A USAID monthly cable on "Food Security Operations" (FSO) will serve as the principal early warning document for A.I.D. decision makers. This monthly food security operations cable, which will be due in Washington on the first working day of each month, will be supplemented as necessary. For example, backup FEWS data will be transmitted separately to meet AID/W needs for regional profiling and central archiving.

At the USAID level, the early warning analysis will be undertaken by the Mission's Food Security Group--a multi-sector and multi-disciplinary committee appointed by the USAID Director. The FEWS field representatives (FFRs) will function as the Group's early warning specialist to assemble and evaluate early warning data for review by this Group; draft the early warning components of the monthly cable; prepare the annual vulnerability assessment; establish and maintain the FEWS database in country; and act as liaison with other early warning efforts in-country.

C

In addition to AFR/TR management of the FEWS project in Washington, an Africa Bureau Food Sector Review Committee will review issues raised in the USAID FSO cables and initiate required actions. The FEWS servicing contractor will train FEWS field representatives in the skill areas needed; serve as the conduit for analytical material from several U.S. and international agencies to USAID offices for use in early warning analysis; advise FFR's, USAID's and host country agencies on assembling and analyzing data for early warning; prioritize and archive data following prescribed data base structuring procedures; monitor incoming field reports to keep A.I.D. apprised of issues related to early warning; and prepare early warning systems status reports for U.S. public consumption.

Finally, a U.S. Government Agency with Geographic Information System (GIS) and analytical capabilities will train FEWS field representatives in the use of various analytical tools; provide back-up servicing of the FEWS data base; provide technical assistance and monitor the FEWS contractor operations.

A concern discussed during the ECPR was that project design be completed as quickly as possible and that Project implementation remain on schedule to insure there is no break in early warning efforts between those that are ongoing and those of this new Project. This will require that project implementation begins before the ongoing FEWS activities end in December 1988. Project implementation and procurement planning is realistic and workable once timely project start-up is accomplished. However, A.I.D. is already behind the schedule outlined in the Project Paper so that we must be even more vigilant to put implementation back on schedule once the Project is approved. It is anticipated that all project obligations will take place within three years of the initial obligation. However, the PACD is December 31, 1992 to insure additional time, if necessary, to implement all project activities.

The statutory checklists have been satisfactorily completed and are included in Annex C of the Project Paper.

The Project design team and the Project Committee considered the advisability of involving Gray Amendment organizations. It was concluded that the most appropriate contracting procedures for the primary implementation contract would be full and open competition, with encouragement for participation of Gray Amendment entities as prime or subcontractors in accordance with Part 19 of the FAR.

No waivers are requested in this Project.

V. Justification to Congress

As FY 1989 is the first year for obligation, a Congressional Notification has not yet been forwarded to the Congress.

VI. Recommendation

That you sign the attached Project Authorization.

Attachments:

1. Project Authorization
2. Project Paper

Clearances:

AFR/PD/SWAP:BBurnett draft Date 9/8/88
AFR/TR/PRO:DMackenzie Date 9/6/88
AFR/SWA:PDichter Date 9/12/88
AFR/EA:DLundberg Date 9/8/88
AFR/DP:JWestley Date 9-8-88
GC/AFR:AAdams Date 9/19/88
AFR/CONT:RKing Date 9/14/88
AFR/PD:AHarding Date 9/21/88
AFR/PD:TBork For PDT Date 9/27/88
AFR/ECO:RCoggins Date 9/23/88
OFDA:JTaft Date 9/7/88
FVA/PPM:TRoss phone Date 9/9/88
M/SER/IRM:JGueron (subs) Date 7/25/88
DAA/AFR:WBollinger Date 9/23/88

AFR/PD/SWAP:NMMcKay:08/12/88:5035M

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

PROJECT AUTHORIZATION

Country: Africa Regional

Project Name: Famine Early Warning System

Project Number: 698-0466

1. Pursuant to provisions in the appropriations heading "Sub-Saharan Africa, Development Assistance" contained in the FY 1988 Foreign Operations, Export Financing and Related Programs Appropriations Act, 1988 and the Foreign Assistance Act of 1961, as amended, I hereby authorize the Famine Early Warning System ("FEWS") Project for the Africa Region involving planned obligations of not to exceed Nine Million United States Dollars ($9,000,000) in grant funds ("Grant") over a four year period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is four years from the date of initial obligation. Monitoring, reporting and other Project activities involving Ethiopia will be financed with funds from the International Disaster Assistance Appropriation account.

2. The project ("Project") will provide resources to help establish a famine early warning system for the Africa region that provides timely information so that international, US and other decision makers can undertake famine prevention initiatives.

3. The Project Agreement, which may be negotiated and executed by the officers to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Commodities, Nationality of Suppliers of Services. The nationality for suppliers of services, including ocean transportation services, and the source and origin of

commodities financed under the Project shall be as set forth in the Africa Bureau Instructions on Implementing Special Procurement Policy rules Governing the Development Fund for Africa (DFA), dated April 4, 1988, as may be from time to time amended.

Charles L. Gladson
Assistant Administrator
Bureau for Africa

9-23-88
Date

Clearances:
DAA/AFR:WBollinger _____ Date 9/26/88
AFR/DP:JWestley _____ Date 9-8-88
AFR/PD:JGraham For _____ Date
AFR/TR:KSherper _____ Date 9/27/88

GC/AFR:DAAdams/gw 2665H/X79218

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE A (A = Add, C = Change, D = Delete) — Amendment Number

DOCUMENT CODE 3

2. COUNTRY/ENTITY Africa Regional

3. PROJECT NUMBER 698-0466

4. BUREAU/OFFICE AFR/TR 11

5. PROJECT TITLE (maximum 40 characters) Famine Early Warning System

6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM 12 DD 31 YY 92

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)

A. Initial FY 89 B. Quarter 1 C. Final FY 91

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 89 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	3,000		3,000	9,000		9,000
(Grant)	(3,000)	( )	(3,000)	(9,000)	( )	(9,000)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country						
Other Donor(s)						
TOTALS	3,000		3,000	9,000		9,000

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) DFA	120	070		--		9,000		9,000	
(2)									
(3)									
(4)									
TOTALS				--		9,000		9,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE COD

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	BS	BR					
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

To help establish a famine early warning system that provides timely information so that decisionmakers can authorize famine prevention initiatives.

14. SCHEDULED EVALUATIONS

Interim MM YY MM 11 YY 90 Final MM YY

15. SOURCE/ORIGIN OF GOODS AND SERVICES

☐ 000 ☐ 941 ☒ Local ☒ Other (Specify) 935

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ____ page PP Amendment.)

17. APPROVED BY

Signature: Keith W. Sherper

Title: Keith Sherper, Director, AFR/TR

Date Signed: MM 09 DD 27 YY 88

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTI

MM DD YY

AID 1330-4 (8-79)

ACRONYMS AND ABREVIATIONS

AA/AFR	- Assistant Administrator for Africa (AID)
ABS	- Annual Budget Submission
AEDES	- Association Europeene pour le Development et la Sante
AID	- Agency for International Development
AFR/TR	- Africa Bureau/Technical Resources/AID
AGRHYMET	- Agro-Hydro-Meteorological Center
AID/W	- Agency for International Development/Washington
ARTEMIS	- Africa Real Time Envir. Monitoring (Imaging Satellites)
AVHRR	- Advanced Very High Resolution Radiometer
CAC	- Climate Analysis Center
CDSS	- Country Development Strategy Statement
CILSS	- Comite Inter-Etat La Lulte Contre la Secheresse au Sahal
COTR	- Contracting Officer's Technical Representative
CRESAL	- Cellule Regionale de Securite Alimentaire
DIAPER	- Diagnostic Permanent
EROS	- Earth Resources Observation System
ERS	- Economic Research Service (USDA)
ESA	- European Space Agency
EWU	- Early Warning Unit
FAO	- Food and Agriculture Organization (UN)
FCCAD	- Foreign Crop Conditions Assessment Division
FED	-.European Development Program
FERU	- Food Emerg. Research Client (London School of Hygiene)
FEWS	- Famine Early Warning System
FFP	- Food for Peace (AID)
FFR	- FEWS Field Representative
FNAP	- Food Needs Assessment Program
FSO	- Food Security Operations
FVA	- Bureau of Food for Peace/AID
GIEWS	- Global Information and Early Warning System
GIS	- Geographic Information Systems
GMS	- Global Monitoring System
GOES	- Geostationary Operational Environmental Satellite
GTS	- Global Telecommunications System
IBRD	- Inter. Bank for Reconstruction and Development (World Bank)
ICOMHA	- International Center for Operational Meteorology & Hydrology in Africa
IGADD	- Intergovernmental Authority for Drought and Development
ITCZ	- Intertropical Convergence Zone

JAWF	- Joint Agriculture Weather Forecastry
LOP	- Life of Project
METEOSAT	- European Stationary Satellite
NASA	- National Aeronautics and Space Administration
NESDIS	- National Satellite Data and Information Service
NGO	- Non-governmental Organization
NOAA	- National Oceanic and Atmospheric Administration
NRMS	- Natural Resources Management Services
NVI	- Normalized Vegetation Index
OFDA	- Office of Foreign Disaster Assistance/AID
OECD	- Organization for Economic Cooperation and Development
PID	- Project Identification Document
PVO	- Private Voluntary Organization
PWA	- Price Williams and Associates
RP	- Refugee Program (State Department)
RRC	- Relief and Rehabilitation Commission
S&T	- Science and Technology Bureau/AID
SADCC	- South African Development Coordination Conference
SAP	- System d'Alerte Precoce (French for EWS)
SERISS	- Sudan-Emergency and Recovery Information and Surveillance System
TU	- Tulane University
USAID	- United States Agency for International Development Missions
UNDP	- United Nations Development Program
UNICEP	- United Nations International Childrens Emergency Fund
USDA	- United States Department of Agriculture
USG	- United States Government
USGS	- US Geological Survey
WFP	- World Food Program
WHO	- World Health Organization
WMO	- World Meteorological Organization (UN)

TABLE OF CONTENTS

	Page
PROJECT DATA SHEET	i
LIST OF ACRONYMS AND ABBREVIATIONS	ii
TABLE OF CONTENTS	iv
ANNEXES	vi
LIST OF TABLES	vi
LIST OF FIGURES	vi
I. INTRODUCTION	1
A. Background	1
B. AID Famine Early Warning System (FEWS) 1985-88	1
C. Lessons Learned from A.I.D. Early Warning Experience To-Date	2
II. DESIGN OF THE FEWS PROJECT	5
A. Definition of Terms and Sectoral Context	5
B. Project Rationale	6
C. Goal, Purpose and Assumptions of the Project	8
1. Overall Goal and Purpose	8
2. Assumptions	8
3. Participating Countries	10
4. Design Alternatives	10
III. PROJECT STRATEGY	12
A. Internalizing Early Warning Within A.I.D.	12
1. Making Early Warning Part of A.I.D. Mainstream Thinking	12
2. Developing an Early Warning Information System	13
3. FEWS Operations and Responsibilities	16
B. Helping to Reinforce Famine Early Warning Capability in Host Government Systems	20
1. Background	20
2. Need for Host Country Early Warning System	20
3. USAID's and the Host Government Early Warning System	22
C. Early Warning in the International Community	25
1. Background	25
2. A.I.D. and International Collaboration on Early Warning Methodologies	26

K

IV. SUMMARY COST ESTIMATE AND FINANCIAL PLAN 34

A. Budget Issues 34
B. The Detailed Budget and Financial Plan 35

V. TECHNICAL ANALYSIS 39

A. Modeling Famine 39
B. The Feasibility of Using Agroclimatic Information in FEWS 40
C. The Feasibility of Using Socio-economic, Health and Nutrition Indicators in FEWS 45
D. Information System Strategy 49
1. Information System 49
2. Data Base Requirements 50
3. Implementation of the Integrated System . . 52
E. Financial Analysis 54
F. Recurrent Costs and Devolution 55
G. Economic Analysis 58
1. Conventional Economic Assessment 58
2. Identifiable Secondary Benefits 59
3. Conclusion 59
H. Social Soundness Analysis 60
1. Socio-Cultural Context and Feasibility . . . 60
2. Beneficiaries and Participation 60
3. Impacts and Other Issues 61

VI. PROJECT IMPLEMENTATION 63

A. Transition Period 63
1. The database 63
2. Software 63
3. Equipment 64
4. Lessons Learned 64
5. Current FEWS FFRs 64
B. New Project Implementation 64
1. Internalization within A.I.D. 65
2. Working with Host Government and Donors in FEWS Countries . . 68
3. Working at the International Level 69
4. Procurement 69

VII. PROJECT MONITORING - EVALUATION PROVISIONS 73

A. Monitoring 73
B. Evaluation 74

VIII. FOOTNOTES 76

LIST OF ANNEXES

Annex A: PID Approval Message
Annex B: Log Frame Matrix
Annex C: Statutory Checklist
Annex D: Methods of Implementating and Financingn
Annex E: Technical Analyses
1. Agro-Climatic Indicators
2. Socio-Economic Indicators
3. The Geographic Information System
Annex F: Project Data Processing Equipment List
Annex G: Environmental Categoric Exclusion

LIST OF TABLES

Table Number		Page
1	Summary Cost Estimate	36
2	Detailed Budget	37
3	Activities of FEWS Components Requiring Use of GIS	53
4	Operational Costs to Sustain and Devolve the Early Warning System	57

LIST OF FIGURES

Figure Number		Page
1	Input-Output Chart	9
2	Implementation Schedule	71

I. INTRODUCTION

A. Background

A severe drought ravaged the Subsahara in 1971-73 causing widespread crop and cattle losses. With the media highlighting the unfolding human suffering, a massive international relief campaign was mounted. Untold African lives were lost, however, because of logistical difficulties in reaching drought victims in rural areas. The tragedy prompted the United Nations system to set up a Global Information and Early Warning System (GIEWS), in 1975, to prevent a recurrence of widespread famine. Some bilateral donor agencies also took special "preparedness" steps to try to anticipate food shortages in Africa before they reached crisis proportions.[1]

By mid-1984, the specter of famine in the Sahel and the Horn of Africa had once again become the lead story on evening news programs. Although there had been several disaster warnings, donors lost vital response time as they sifted through diverse sets of data for credible evidence of pending food shortage. The lesson was clear: not only must the warning be as early as possible, but there must be agreement between donors and host governments on the nature and extent of the problem and the kind and quantity of external assistance needed. In May 1985, in the wake of the second African tragedy in fifteen years, a meeting of international experts at the Bonn Summit proposed:

> "there should be better arrangements for monitoring crops and the access to food for vulnerable groups. This will require collaboration with African countries and international organizations to improve early warning systems and distribution of emergency food supplies. It also implies assistance to African Governments...to improve national and regional preparedness plans."

B. AID Famine Early Warning System (FEWS) 1985-88

FEWS was created under crisis conditions in July 1985 and, consequently, was not subject to the customary AID project design process. The principal objectives of FEWS were to identify problems which might lead to a famine emergency, to target populations at risk at the sub-country level, and to provide USG decision-makers with timely and credible information for response purposes.

FEWS was launched with a contract awarded to the Departments of Biostatistics and Epidemiology in Tulane University's School of Public Health. The contract focused on searching for clues of nutritional stress in vulnerable populations because U.S. relief strategies in Africa had been hindered by the absence of health and demographic data. The University stationed Public Health Advisors in six countries with responsibilities for collecting vulnerability data. As the drought crisis eased, with a good harvest in October - November 1985, the types of early warning indicators were expanded to improve the scope and timeliness of the system.

In December 1985, AID contracted with Price Williams & Associates (PWA), a data-management firm, to develop a computer-based geographic information system (GIS) to integrate data from satellite and traditional sources. The PWA group, in effect, served as the research and development laboratory working out methodologies for analysis of satellite data, GIS microcomputer applications and vulnerability assessment techniques. In April 1986 PWA started publishing monthly reports related to at-risk groups in FEWS countries. The Universities of Pennsylvania and Tennessee were also hired to develop transportation and logistics planning software packages.

During 1986-88, FEWS also developed contractual relationships with the following agencies in the U.S. Government: FCCAD and JAWF in USDA for work on agricultural climate impact assessments and remote sensing methodologies; NESDIS and CAC in NOAA for assistance on climate impact assessments and international meteorological data; NASA for specially processed satellite data; and the EROS Data Center of the USGS for advice on GIS systems.

FEWS field representatives (FFRs) are currently stationed in Sudan, Mali, Niger, Burkina Faso, Mauritania and Chad. The at-risk situation in Ethiopia and Mozambique is also monitored by FEWS, but without in-country staff. The FEWS project has been managed by AFR/TR in AID/Washington.

C. Lessons Learned from AID Early Warning Experience To-Date

From its experience with early warning issues over the past three years, AID has gained several important insights for use in designing the 1989-91 FEWS activity:

o Enormity of the FEWS task

Monitoring hunger and potential famine in FEWS countries is an enormous task. The land area involved is larger than the continental United States and includes a wide diversity

of food production systems, cultures and institutions. Yet this vast area is poorly served by transportation and communication systems as well as physical and social monitoring networks. Thus, information is not always centrally available, and reports about conditions in remote areas often arrive late and, invariably, contain large geographical and historical gaps in data.

o Fragility of the data base

Most of the data used in donor early warning efforts come from secondary sources. The reliability of these sources is uneven and serious gaps can occur. Consequently, data sets are seldom, in and of themselves, sufficiently comprehensive to discern pre-famine conditions in a given area. In trying to identify populations at risk, analysts must use a "convergence of indicators" methodology after assembling diverse types of information e.g., field data (socio-economic, agrometeorological), together with remotely sensed data. First-hand familiarity with the local conditions and information sources will always remain a key requisite in "at-risk" assessments.

o Need for a host country early warning capability

Without an early warning capability, governments in famine-prone countries will be repeatedly lurching from one crisis to another because they are unable to anticipate or prevent severe food shortages. Without a focal point for early warning at the national level, it is difficult to systematically extract "real-time" data from the line data collection systems (agriculture, health, statistics, etc.) which are needed to assess vulnerability and plan early relief campaigns. Host country early warning agencies can serve as a useful locus for donor and government representatives to sort through sets of data of uneven quality to arrive at order-of-magnitude estimates of potential food shortages.

o Need to insert FEWS into AID mainstream thinking

AID is a development-oriented agency. Activities within AID tend to be de-emphasized if they are not perceived as integral elements of AID's long-term development strategy[2]. This means that an AID early warning effort will be effective only to the extent that it becomes part of AID mainstream thinking--in

the USAID Missions as well as AID/W. Three steps must be taken within the agency "to make FEWS work": legitimize early warning as a AID development concern, reflect this legitimization in AID development strategies and documents (e.g., CDSS, Action Plans, ABS) and, include responsibility for FEWS effectiveness in performance standards for senior AID officials.

o <u>Need to work with other donors in developing an early warning methodology</u>

A proliferation of donor-sponsored early warning schemes sprang up in the aftermath of the 1983-85 African drought. Some have already fallen by the wayside, but a number of uncoordinated efforts remain prompting concerns about overlap, duplication and cost effectiveness. The proliferation results largely from differences over what should be emphasized in early warning strategies. Current strategies tend to be criticized for being too aggregated and prone to overlook areas of need, too mired down in unrepresentative micro-analysis, or too high-tech oriented to detect localized vulnerability. Part of the problem stems from the lack of an acceptable theory of famine--what famine is, what causes it and what indicators presage its appearance. Since it is not likely, however, that an acceptable model of famine will be constructed in the near term, the larger part of the problem relates to an inability to agree on a concerted multi-donor strategy for detecting "lack of access to food" before famine conditions set in. Promulgating the need for this strategy, helping to design it and using AID resources to implement it are major objectives in the new FEWS project.

II. DESIGN OF THE FEWS PROJECT

A. Definition of Terms and Sectoral Context

Most people have little difficulty recognizing the ravages of famine. But when devising a strategy for preventing famine, progress can be slowed by disagreement over definitions and methodologies. These analytical difficulties are discussed fully in Chapter V of this paper. Some working definitions are required here, however, before laying out the project strategy:

- "Famine" refers to "the state of prolonged food intake deficiency which ultimately leads to excess deaths in a district, region or country as a whole";[3]

- "Early Warning" refers to giving notice of populations at-risk (i.e., potential famine victims) in time to prevent famine through non-emergency[4] measures; and

- "Information System" refers to the process of gathering, analyzing and presenting information to facilitate decision making on famine prevention initiatives.

Famine must be viewed as a complex economic, social and political issue rather than simply a problem of food production and drought. For convenience sake, the causes of famine can be categorized under the following headings: underlying, triggering and immediate. The underlying causes of famine are poverty and underdevelopment. Developed countries do not suffer from famine even during severe drought cycles. The triggering cause of famine is usually one, or a combination, of the following factors: drought, leading to crop failure; loss of purchasing power or "entitlement"; and/or, government(s) indifference. The immediate cause of famine is a lack of access to food.

In trying to prevent famine, it is important to understand why and how people lose access to food and the relationships of variables that lead to famine. In this connection, increasing emphasis is being placed on discerning the progressive responses of individuals and communities to food shortage situations. These behavioral responses, referred to as coping mechanisms, can be viewed as socio-economic indicators of famine build-up. Used with other information (e.g. rainfall, satellite images, etc.), these indicators can give early signals of social, economic and institutional stress. Appropriate interventions can then be designed to mitigate the detrimental impacts of each stage in a mounting food crises.

Early warning should not be viewed as an "emergency assistance activity" or as a component in an Emergency Management System. Early warning efforts are not aimed at improving the management of famine. Rather, they are designed to eliminate the need for large-scale famine relief operations which are very costly and notoriously ineffective.[5] These relief campaigns represent a failure to head off a phenomenon--famine--which is preventable precisely because of its slow onset. By presenting evidence of food-system stress early in the slow process of regional disintegration, decision makers are able to take compensatory steps, in a non-emergency mode, to avert severe food shortages.

Early warning efforts are more properly viewed as one component in a nation's food security strategy aimed at ensuring that all people have the physical and economic access to the food they need. A food security strategy must deal with three aspects of the food problem: transitory food insecurity, which occurs when households are faced with a temporary inability to acquire food due to sporadic misfortunes such as drought; chronic food insecurity which exists when households suffer from a persistent inability to acquire enough food to eat; and the root cause of food insecurity, i.e. insufficient real income of households to acquire food either through growing it or purchasing it.[6]

According to a World Bank Task Force on Food Security, "the prospects of increasing real incomes of the food-insecure in Africa are not promising at this juncture."[7] The Task Force viewed "on-going efforts to promote per capita income growth [as] an essential element of a sound food security strategy. But these approaches should be accompanied by the introduction of new elements into the development equation including "a more systematic effort to identify the groups at high risk of food insecurity and to develop action plans to deal with food insecurity."

The task of identifying at-risk groups in time to avert suffering calls for an effective early warning system in AID's food security sector strategy for ending hunger in Africa.

B. Project Rationale

An early warning system is, at core, an information system. The effectiveness of an information system depends on the quality of its data, analysis and transmission.

The quality of data collection, analysis and transmission in Africa varies considerably. Countries with stronger economies have been able to expand and modernize the information

systems they inherited at independence. The statistical information which emerges from line agencies (e.g. agriculture, health, commerce etc.) in these countries is accepted, at face value, by national leaders and the international community. These countries do not experience famine even though they do have bad crop years caused by drought and other natural misfortunes. Their effective data collection and analysis systems allow governments to anticipate food shortages and take timely steps, sometimes with donor assistance, to avoid hunger and suffering even in remote parts of the country.

Poorer African nations have been less successful in upgrading their information systems over recent years, particularly those which have been gripped by drought, civil strife, and/or policy mismanagement. Low salaries, inadequate supervision and "no petrol" have depleted the ranks of enumerators in some of these countries. In others, data continue to flow into central offices, as in the past, but remain in the storeroom, unanalyzed, for lack of funds for training and/or equipment. Finally, there are a few less endowed countries where data are collected systematically and published on an aggregated basis. Even here, however, the data survey focus is usually too narrow to encompass socio-economic indicators needed to understand conditions in the countryside.

The weakness of reporting systems in some African countries tends to be revealed during the early stages of food crises. National leaders and donor representatives have difficulty discerning the location or size of the groups hardest hit by food shortages in the rural areas. All too often, governments are prodded by the foreign press to send special fact-finding teams to the countryside. These teams try, belatedly, to compensate for the irregular flow of information on the at-risk populations.

In the wake of recent famine tragedies in Africa, serious efforts have been made by governments with donor help to reinforce and upgrade information systems dealing with meteorological and crop condition data. For example, noticeable progress has been made with the AGRHYMET and Diagnostic Permanent Projects in the Sahel countries, the SERISS project in Sudan, and efforts to improve the Central Statistics Division in Ethiopia. Getting information systems to the point where their analysis is accepted at face value, however, is a challenging task which will require sustained local attention and outside assistance over the medium term.

While these information systems are being brought on-stream and until their credibility is established, however, neither African governments nor donors want to relive the experience of 1983-1985 when thousands of African lives were lost as

protracted discussions took place over the credibility of data. What is needed, for the near term, is a government-donor effort that extracts data from the improving government information systems and supplements it with a variety of other data from diverse sources (ground and remotely sensed; government and private) to draw timely conclusions about the potential for severe food shortages so that government and donor decisionmakers can devise strategies for averting famine. What is needed is a collaborative famine early warning system.

C. Goal, Purpose and Assumptions of the Project

1. Overall goal and purpose

The overall goal of FEWS is to reduce the incidence of famine in Africa thereby helping insure food security in famine-prone countries. The purpose of this three-year activity is to help establish a famine early warning system that provides timely information so that decision makers can authorize famine prevention initiatives (see Figure 1 for Input/Output Chart). In carrying out the project purpose, three needs must be addressed:

- AID's internal need for a famine early warning capability within the AID organization;
- Host countries' needs to create or reinforce national early warning systems; and
- The international community's need to collaborate on the evolution of an acceptable early warning methodology.

2. Assumptions

One important premise underlies the rationale for the FEWS activity--famine, or widespread starvation, is a human-caused disaster. Global food availabilities, together with modern transportation, make it possible to deliver food to at-risk communities well before the starvation stage. Famine occurs only when governments or other entities interfere with detecting or bringing relief to communities who lack access to food. Other assumptions made in designing this activity are:

- Existing information systems (ground and remote), with minor supplementation, can yield sufficient data, on a timely basis, to permit conclusions about the potential for famine;

FIGURE 1 - INPUT/OUTPUT CHART
FAMINE EARLY WARNING SYSTEM PROJECT

GOAL To reduce the incidence of famine in Africa thereby helping to ensure food security in famine prone countries.

PURPOSE To help establish a famine early warning system that provides timely information so that decision makers can authorize famine prevention initiatives.

OBJECTIVES	INPUTS	OUTPUTS	CONDITION AT END OF PROJECT
INTERNALIZE EARLY WARNING IN A.I.D.	PERSONNEL: A.I.D., AID/W, Contractor, USGS, USAID TECH ASST: USAID, FAO, USDA, USGS, NOAA, OTHER COMMODITIES AND OTHER: GIS, Travel & FFR, Vehicle, FFR Housing	USAID: EW Data .Collection .Analysis; Food Sec Monitor Sys; EWS Reporting System; USAID EW Data Base; Trained USAID Staff; GIS System Installed; Links to . Regional Networks . Internal Network . Other Donors . Early Warnings; USAID Alertness to EWS AID/W: Food Security Monitor Systems for . Review Field EW Data . Other Data . Decision Making . Access to VIEWS/ ARTEMIS & JAWF . Interagency & Inter-Donor Collaboration	A SYSTEM INSTALLED IN A.I.D. FOR EARLY WARNING
IMPROVE EARLY WARNING FOR HOST GOVT	Daily FFP Dial Qtrly USAID/D Dial Workshop(s) Training Equipment Link Work to Regular & Int'l Development	EARLY WARNINGS Improved: . Data Collection . Trained Staff . Manuals . Better Networking (In and Out) . More Systems Approach to Early Warning	AN IMPROVING CAPABILITY IN HOST COUNTRY FOR FOR EWS
PROMOTE A COMMON METHOD TO EW AT INTL LEVEL	Meetings Specific & Informed Agendas Technical Asst On-Going Consulting on Early Warning	Agreement On: . Definitions . Guidelines . Indicators . Data Collection Methodology . Analytical Methodology Guide to Donor Field Missions Agenda for Host Govt/Donor Dialog	A SLOWLY-EVOLVING "ACCEPTABLE" METHODOLOGY FOR EW AT INTERNATIONAL LEVEL

5042M

- Host governments will facilitate timely extraction of data from their information systems and cooperate with donors in the "data brokering" process;

- An early warning sensitivity can be internalized by AID and FEWS can be "made to work" through appropriate agency incentives;

- A working methodology can be devised at the international level which will result in better and more cost-effective detection of famine potential in famine-prone countries; and

- Decision-makers (host country, bilateral and international) will initiate famine preventive measures after receiving credible evidence of famine potential.

3. Participating countries

The countries initially participating in FEWS include: Burkina, Chad, Mali, Mauritania, Niger, and Sudan. A FEWS activity for Ethiopia will be approved and funded under a Foreign Disaster Assistance authorization and appropriation account as this country is under Brooke Alexander prohibition.

4. Design alternatives

The Project Design Team considered five design alternatives as outlined in the PID: (i) the informal, in-country early warning mechanism, which relies upon diverse information sources such as missionaries, PVOs and a variety of host-government data sources; (ii) expansion of existing international data networks such as those of FAO, USDA and AGRHYMET; (iii) development of target country, early warning capability; (iv) establishing an entirely separate and parallel AID famine early warning system and (v) modification of the existing AID/FEWS project.

The design team concluded as follows with respect to the five options:

- First option--"uncoordinated micro-level efforts do not add up to an early warning system."

- Second option--"international data networks can supplement but not replace in-country systems."

- Third option--"the host country early warning system will be the matrix (primary) system from which add-on (secondary) systems will be devised to satisfy donor needs for famine prevention data. These systems are in a formative stage."

- Fourth option--"a separate and parallel system is neither financially nor politically feasible."

The team concluded that an amalgam of the first four options was called for and it would, in effect, amount to a fifth option--a modification of the existing FEWS activity.

III. PROJECT STRATEGY

The FEWS Project has three objectives: (1) internalizing an early warning sensitivity within the AID organization; (2) helping to create or improve early warning capability in host governments; and, (3) collaborating with others on the development of an early warning methodology for famine-prone countries. The Input-Output Chart (Figure 1) illustrates the linkages among the three objectives and the various elements of the project strategy.

A. Internalizing Early Warning Within AID

1. Making early warning part of AID mainstream thinking

Efforts "to get ahead of the curve" on severe food shortages are not new in AID. Various attempts were made during the 1970's, particularly within the Africa Bureau, to assign "preparedness responsibilities". In some quarters, however, preparedness considerations were considered marginal to the Agency's principal task in Africa, i.e., long-term development. This began to change in 1985 with the decision to devote "add-on" resources (staff and money) for the development of early warning capabilities within AID. Progress came slowly, however, partly due to the need for experimentation on early warning approaches and, partly, because USAID Missions tended to view FEWS as "an AID/W project."

Currently, a consensus is emerging in AID/W, as well as in the field, that early warning must become an integral part of the Bureau's Food Security Strategy aimed at helping to end hunger in Africa. According to this thinking, unless a more effective methodology can be devised for detecting the potential for famine, AID development energies will be increasingly diverted from longer term objectives to coping with the latest-breaking food crisis. For this reason, the Africa Bureau is taking three steps "to make FEWS work": first, it has legitimized early warning as a development concern and priority; second, guidance is being drafted to reflect this legitimacy in Bureau development strategies and documents (e.g. CDSS, Action Plan, ABS); and, third, responsibility for FEWS effectiveness is being incorporated into performance standards for senior AID officials.

2. Developing an early warning information system

a. Assessing vulnerability

The primary task of a famine early warning system is to monitor areas of the country where populations are particularly vulnerable to episodic food shortages. In principle, this means monitoring the entire country to determine which areas stand out as particularly vulnerable. In reality the traditional food-insecure areas are well known in-country--both to indigenous leaders and to expatriate advisors. In this sense an informal, historical data base on vulnerable areas already exists in famine-prone countries. The problem, until recently, was that this intuitive recognition seldom was rationalized, documented or codified so that normal and abnormal conditions would be differentiated and timely steps taken to avert disasters. The function of an early warning system is to build and maintain an explicit data base on vulnerable populations to help analysts sort out normality from abnormality and to determine what segments of the population are at risk.

b. Using indicators

At-risk populations are those whose health or life might be jeopardized unless outside assistance is furnished in case of need. Experience suggests that a select set of key variables, or indicators, can provide timely warning of probable need. There are essentially two types of indicators--physical (agroclimatological) and socio-economic. Some of the physical indicators can be collected by remote sensing, but they usually require systematic surface verification. Other data relating to physical, biologic and socio-economic phenomena can be collected only by systematic field survey and verification.

Indicators must be understood as proxy variables; they represent timely bits of accessible information that can help identify possible difficulties. Indicators of local conditions must be verified in the field before action is taken because the analyst's underlying assumptions may not be valid. Under the FEWS project, there will be several checks and balances to safeguard against faulty analysis. First, FEWS will rely on a "convergence of indicators" approach rather than on a single indicator or type of indicator. Thus, climatological, agricultural, economic, social and health information will be examined in their ensemble when assessing a given food supply situation. Second, there is full awareness that accurate assessment depends on analysis of the local context. Third, all preliminary judgments will be tested in the field through verification procedures, such as by informant interviewing.

c. Sources of information for FEWS

USAID early warning efforts must rely heavily on non-AID sources of information. Setting up an "AID country-wide data collection system" that runs parallel to the host government's regular data collection network would be neither politically nor financially feasible. Two principal sources of AID early warning information will be the host governments' regular data-collection systems (e.g., agriculture, health, statistics, etc.) and African regional networks with responsibilities in agroclimatology or remote sensing (e.g., AGRHYMET). These sources will be supplemented by private in-country networks (e.g., voluntary agencies and commercial entities), other donor vulnerability assessment projects (e.g., SAP/AEDES), international early warning or monitoring activities (e.g., GIEWS and ARTEMIS) and US-based services (NOAA, USDA, NASA and USGS).

AID reliance on data and analysis emerging from this wide spectrum of information systems will be based on the source's track record for credibility and its ability to produce in real time. In addition to providing support for in-country data collection systems, through development program funding, AID will finance special micro-level vulnerability assessments--within multi-donor frameworks--to help monitor at-risk populations. AID will continue to make use of remote sensing products and U.S.-origin agroclimatological assessments while Africa regional and international early warning systems are conducting trial run operations of their own systems over the next few years.

d. Information handling in FEWS

The multiple sources of data will yield a wide variety of socio-economic and physical information. A fully integrated computerized information system will be used to manipulate data on a spatial and tabular basis to reveal not only what is occurring, but when and where. This will be accomplished using a geographic information system (GIS), which operates on geographically registered data and has capabilities ranging from simple (carto) graphic displays to complex data mergers and analysis procedures as a tool to efficiently store, retrieve, and analyze data.

The FEWS GIS will operate at three integrated levels: 1) the Missions, 2) AID/W, and 3) USG processing facility. This will meet user needs without overburdening those users and provide system efficiencies with more complicated tasks performed at levels 2 or 3 as appropriate.

Missions will be furnished with micro-computers which will be used to store and access spatial and tabular data, conduct statistical analyses, and display geographic data. The Missions will be supported by two facilities in the United States. The Washington contractor will have capabilities for graphic output (of publication quality), merger of cross-border data for regional profiling, analysis of remotely sensed data (including agrometeorological interpretations), and complex spatial and statistical analyses. More elaborate equipment of a USG data processing facility will be available for complex data merger required for database development, and for data networking with other AID, USG, and International information systems, where their data are useful to FEWS.

e. FEWS data analysis and reporting system

Subjective and anecdotal data have provided much of the grist for AID food crisis forecasting in the past. Better data have begun to emerge with satellite imagery and gradually improving data collection efforts in the field. Because of the underlying fragility of the database in FEWS countries, however, first hand familiarity with local data sources and information systems will remain a requisite during any data assessment or analysis exercise.

Since USAID officials are required to be knowledgeable about the "in-country terrain", their experiences and views are particularly pertinent. Consequently, data analysis under this FEWS activity will be the responsibility of USAID Mission offices. This represents a major shift from the FEWS approach during 1986-1988 when responsibility for data assessment resided in Washington. The change reflects AID's recognition that its early warning efforts cannot succeed unless the key role of USAID's and host government participation is fully understood.

A USAID monthly cable on "Food Security Operations" (FSO) will serve as the principal early warning document for AID decision makers. Missions are currently reporting to a number of clients in Washington (FFP, FNAP, FEWS contractors, Desks, OFDA, etc.) on food-related issues. Only glimpses of the food security picture can be presented in these "slugged" messages. The proposed comprehensive monthly treatment of important food security operation issues will help (i) underscore the need to view food issues in a development continuum ranging from early warning to synchronizing imports with local production, pricing and marketing, emergency feeding programs, etc., (ii) cut down on the number of "ad hoc" requests for information on food security issues, and (iii) reinforce multi-disciplinary collaboration in USAID Missions as well as AID/W.

In the monthly cables, the USAID will periodically highlight key FEWS specific seasonal concerns. Thus, in May a vulnerability profile will identify elements of the population which would be "at risk" if the rains are inadequate. In the September cable, there will be a comprehensive treatment of the rainfall situation, a forecast of crop prospects, and a call forward food aid, if necessary. In December, a full food crop production assessment will be provided. At other monthly intervals, insights will be furnished on related food security issues such as food needs assessment program, nutrition surveillance programs, management of food aid, effects of structural adjustment programs on vulnerable groups, etc. The monthly food security operations cable, which will be due in Washington on the first working day of each month, will be supplemented as necessary. For example, backup FEWS data will be transmitted separately to meet AID/W needs for regional profiling and central archiving.

3. FEWS operations and responsibilities

The principal users of AID's internal early warning system are those AID officials charged with taking action, on behalf of the USG, when the potential for famine is manifested; namely: the AID Administrator, the Assistant Administrator for Africa, and the USAID Director of the affected country. In deciding whether to act or not, these decision makers rely heavily on the staff analysis which emerges from the early warning system.

At the USAID level, the early warning analysis will be undertaken by the Mission's Food Security Group--a multi-sector and multi-disciplined committee appointed by the USAID Director. The FEWS field representatives (FFRs) will function as the Group's early warning specialist with responsibilities for:

- o Assembling and evaluating early warning data for review by the Food Security Group;
- o Drafting early warning components of the monthly food security operations cable;
- o Preparing the annual (May) vulnerability assessment;

In addition, the FFR will be responsible for general FEWS-related activities which include:

- o Establishing and maintaining the FEWS database in country;

- Liaising with the host government's EWS office, as well as other government agencies and private groups with access to early-warning-type information; and

- Drawing on the insights and technical services of the FEWS back-up in Washington and USG technical agency (see VI below).

Responsibility for Food Security issues at the AID/AFR Washington level will be assigned to the Bureau's Food Sector Review Committee, chaired by the Senior Deputy Assistant Administrator, and comprised of representatives from key AFR offices, FFP, OFDA, S&T, and State/RP. The Committee will meet on the fifth working day of each month to review issues raised in USAID FSO cables and initiate action as required. The Review Committee deliberations and recommendations will be cabled to individual USAID Missions no later than the seventh working day of each month. The Committee will also be responsible for compiling an Early Warning Profile in September of each year to be used by the AA/AFR in briefing the AID Administrator on probable "trouble spots" in Africa resulting from the prospective food availability situation. This profile will be updated and adjusted for a follow-on briefing in early December after harvest figures have become available.

AFR/TR will be responsible for management of the FEWS activity in Washington. Responsibilities will include:

- Providing AID/W backup for USAID Missions on FEWS-related matters;

- Chairing the FEWS Project Committee which will be responsible for AID/W monitoring of FEWS activities (see section VII);

- Ensuring that all early warning issues are thoroughly aired at the Food Sector Review sessions;

- Serving as the AID contracting Officer's Technical Representative (COTR) for the FEWS servicing contract (see below);

- Directing AID's participation in, and monitoring other donor collaboration, on the evolution of an early warning methodology as spelled out in Section III.C;

- Liaising with other U.S. Government Agencies (e.g., USDA, NASA, and USGS) and monitoring their efforts to strengthen the FEWS information base; and

- Liaising with FAO, WMO and Africa Regional Organizations so as to (i) utilize their information in the FEWS and (ii) help strengthen international early warning capabilities.

AID will finance a FEWS servicing contract to provide assistance in the following areas:

- Training FEWS field reps. The contractor will be responsible for training FFR's in each of the skill areas needed to carry out FEWS tasks. This training will be conducted throughout the project, and will be particularly concentrated during an initial ten-week orientation at the start of the project, and during semi-annual workshop(s) for all FFR's at a central African or US location and in-country meetings as necessary. GIS training will be conducted by a USG agency (see below);

- Data networking and transmission to field. The contractor will serve as the conduit for analytical material from several agencies (U.S. and international) to USAID offices for use in early warning analysis. In this way satellite weather images, vegetation indices and agrometeorological data will be made available to FEWS Missions from such agencies as USDA (JAWF and ERS), FAO (GIEWS and ARTEMIS), and the USG agency selected for its GIS expertise;[8]

- Data collecting and assessing methodologies. The contractor will be responsible for advising FFRs, USAIDs, and host country agencies on techniques and methodologies for assembling and analyzing data for early warning purposes. The contractor will also design a means to assess the effectiveness of the early warning methodology by relating the instances and absences of early warning issuances to actual events and, as required, to adjust the methodology as necessary.

- Data base structuring. The contractor will be responsible for data prioritization and archiving following a prescribed data base structuring procedure. While the data base will be structured with early warning requirements in mind, a concerted effort will be made to effect compatibility with AID development project data bases;

- o Regional profiling. The contractor will monitor incoming field reports for cross-country border anomalies to (i) keep USAID's and AID/W apprised of issues related to early warning strategies and (ii) to aggregate the cross-border information for use in regional profiling, as needed, in trimestral reports; and

- o Trimestral reports. In addition to contributions to the monthly Food Security cable, the contractor will compile three EWS status reports for U.S. public consumption. These reports will be published in June (vulnerability issues), October (rainfall situation) and January (harvest results). In the Southern Hemisphere the reporting schedule would be arranged to parallel the crop cycle there. The reports will be based on USAID Mission monthly reports and other available material.

AID will also finance an operational agreement with a U.S. Government Agency which has sophisticated GIS and analytical capabilities. This agency will be responsible for (i) training FEWS field reps in the use of the GIS and other analytical tools, (ii) back-up servicing of the FEWS data base in areas calling for high tech equipment, and complex manipulations of large data bases or digitizing, (iii) providing technical assistance to USAID's, AID/W, and the FEWS contractor on all aspects of the GIS, data archiving, data standards, assessment and presentation related to AID early warning activities, (iv) furnishing advice on GIS to host government early warning agencies when requested to do so by USAID Missions, and (v) monitoring, from a technical standpoint, the FEWS contractor operations in the GIS and international data transmission areas.

The above section has outlined the elements of AID's early warning information system--data, analysis, reporting--and has indicated who will be responsible for what operations in the course of providing AID decision makers with sufficient information to act in a non-emergency mode. How these operations will unfold is discussed in Chapter VI-- Project Implementation. What follows below is a description of AID's reliance on host government information systems and a strategy for interfacing with those systems.

B. Helping to Reinforce Famine Early Warning Capability in Host Government Systems

1. Background

The lack of early warning capability in Africa was underscored in the 1985 post-drought analyses with one observer characterizing the Sahelian situation in this way:

> "In 1984, the parties concerned--Governments, donor agencies and NGOs--had to act on the basis of data that were both unreliable and slow to arrive. This made for adverse consequences, chiefly a delay in the arrival of food aid, along with its attendant drawbacks; above all, populations that were not helped, and then paradoxically, the disruption of prices and markets and the overfilling of silos due to surpluses. These adverse effects were all the greater since the autumn 1985 harvest was on the whole an abundant one. The many actors involved are virtually unanimous in the view that good information and an early-warning system that worked well would have prevented a sizeable proportion of the difficulties encountered."[9]

This sensitivity to the need for an early warning system also emerged in the non-Sahelian drought-prone countries in 1985. Early warning units were established within the Relief and Rehabilitation Commission's (RRC) in Sudan and Ethiopia. Governments had come to realize that without an early warning capability, they would be repeatedly caught up in the emergency syndrome--lurching from one crisis to another unable to anticipate or prevent food shortages.

Early warning units (EWU) have operated with varying degrees of effectiveness over the past three years. Some EWUs have been particularly diligent about micro-level "at-risk" assessments while others have been content to work with aggregated figures in searching for stress signals. Some EWUs have been relatively more effective in lobbying for operating funds within their national budget structures. Finally, a few EWUs have been more successful than others in interfacing with regular government departments--upon whom they depend for much of their early warning data.

2. Need for host country early warning system

Notwithstanding the unevenness in EWU performance, one thing is clear: donor early warning efforts stand a better chance of success in countries with a well-functioning EWU. Without a focal point for early warning at the national level,

it is difficult to extract data, systematically and in real time, from in-country data collection systems (e.g., agricultural, health, statistics, etc.). These line agencies have their own internal procedures and timetables which must be adjusted if useful vulnerability and at-risk data are to be obtained from them. It is also difficult to effect the degree of inter-Ministerial coordination needed for a national level consensus on at-risk issues without an early warning coordinator. When appropriately placed in the government, the early warning coordinator can enlist the help of the chief executive in mobilizing government-wide energies to overcome these structural and coordination difficulties.

EWUs can also serve as a useful venue for donors and government representatives in planning vulnerability assessment strategies, working out early warning methodologies and for discussing the validity of various indicators. Since data collection and analysis systems are still evolving in FEWS countries, it is necessary to sort through numerous sets of data of uneven quality to arrive at order-of-magnitude estimates of potential food shortages. This sorting process is best done in a collaborative mode so that suspicions of "data sanitization" do not arise, and conclusions can be reached that are subscribed to by both the donor community and the host governments. As Hervio points out: "information which has the approval of both the [host] country's technical services and the donor representatives clearly carries more weight with all the parties concerned than information coming from a single source, even if it is financed by the donor in question."[10]

Another function the EWUs can carry out is coordinating early warning inputs, at the national level, contributed by Africa regional organizations and international agencies. The situation in the Sahel Region is particularly instructive in this regard. There are three CILSS-donor sponsored activities aimed at improving the region's agricultural potential in the medium term: AGRHYMET (agrohydrometeorological); Diagnostic Permanent (agriculture statistics and planning); and, the Renewable Resource Monitoring Project which uses FED financed Landsat satellite data. These activities have already made important contributions by strengthening the Region's agricultural data bases and information systems--a "longer term" objective. But they are also producing data and insights needed for "real-time" analysis under early warning exercises. The value of AGRHYMET information for early warning purposes will be enhanced with the installation in Niamey of a joint French/US financed AVHRR satellite data receiving and processing station in July 1988. The same will be true of Diagnostic Permanent when the CRESAL activity comes under its wing.

Much of the information from the Sahel Regional Programs is multi-disciplinary in nature and, consequently, overarches data boundaries of individual Ministries or Departments. The EWUs can serve as the focal point in national governments for receiving, assembling and prioritizing this cross-sector information from out-of-country sources. This would include data coming through regional networks but originating at the international level--as in the case with the Dutch financed FAO/ARTEMIS information which will be channeled through AGRHYMET beginning August 1988.

Regional networking has not yet coalesced in other parts of Africa to the degree it has in the Sahel. But SADCC and IGADD officials are monitoring the CILSS/AGRHYMET approach to early warning issues with the intention of launching their own regional alert strategies in the near term.

3. USAIDs and the Host Government Early Warning System

The USAID role vis-a-vis the host governments's EWU is to form part of the Unit's supporting cast. This does not mean that USAID Missions will always agree with or endorse EWU positions or undertakings. The USAID supportive role is simply an acknowledgement of the need for a central, in-country early warning system if effective strategies are to be designed for avoiding food crises. Working with other donors, USAID Missions will provide support to EWUs in three areas: helping to strengthen EWS in-country networks; improving early warning methodologies; and, upgrading information systems.

Well-functioning early warning systems have two components: a high-level government/donor committee, and a secretariat or "cell"--herein referred to as the early warning unit. The high-level committee meets periodically to review information (vulnerability assessments, rainfall data, harvest production, etc.) needed to assess food supply situations. The EWU provides ongoing monitoring of vulnerability and at-risk factors, regularly interfaces with agencies (government, donor and regional) and prepares materials for high-level committee review.

Where high-level committees and/or EWUs exist in FEWS countries, there is considerable scope for improving their performance. With respect to the committees, there is a tendency to defer meetings during the "quiet time" of the year, January to May, and then try to catch up during July to September--when, unfortunately, key members of the Committee are often out of country on leave. Concerning the EWUs, their staff too often get caught up in emergency operations because these units tend to be housed in relief commissions. In some Sahel countries, EWUs exist only in an incipient form--a problem which has been highlighted by CILSS/Club officials in recent months.

USAID Missions will take a three-pronged approach in helping to strengthen local early warning capability. The USAID Director, or his deputy, will work collaboratively with the EWU Director and donor colleagues to bring more structure to high-level meetings. This will entail regularizing these meetings out of recognition that famine prevention strategies succeed only when there is year-round monitoring of vulnerable populations. Efforts will also be made to set more specific agenda for high-level meetings, assign "action" responsibilities, and report follow-up status at subsequent meetings. By tightening up on committee procedures, there is less likelihood that important issues will slide from month-to-month resulting in a backlog of outstanding actions and "the inevitable period of panic programming."

Concomitantly, the FFR will work at the technical level with other donor experts to strengthen the governments early warning system. This may entail helping the EWU define its role if the Unit is part of a large Ministry or Commission. Consequently, the FFR should be well versed in the literature on early warning concepts, their relation to development priorities, and the lessons learned from attempts elsewhere in Africa to set up early warning offices.

As an early warning system begins to evolve in-country, the FFR can be helpful by reinforcing, informally, the linkages between the EWU and key data-collection agencies. With help from other USAID officers, he can do the same with Regional Networks like AGRHYMET, private voluntary agencies and the Peace Corps. Organizations whose members live in or near traditionally vulnerable areas can be a valuable source of information on socio-economic patterns and famine coping phenomena. In trying to forge these linkages, however, FFR's,--like EWU Directors and staff--will have to keep in mind Pons' shrewd observation:

> "The early warning system judged to be the best cannot be set up all at once. Habits die hard, human mentalities and behavior evolve slowly. The entire range of facilities . . . and inter-penetrated structures [contain] an inertia inherent in any complex system. It would be unrealistic to hope for a rapid rearrangement of everything . . . within and around the early warning system"[11]

The FFR will also work closely with the EWU in improving data availability and quality and thereby the reliability of early analyses. Where additional effort and technical assistance is required beyond that available from the

FFR, the FFR will identify and recommend technical activities to USAID; these efforts could be conducted through Mission buy-in options. This objective will be achieved through the development of an EWS working model entailing several activities of an essentially methodological nature:

- Determining which indicators provide the most timely warning;
- Determining what data are necessary for particular indicators;
- Striving for greater standardization of research under projects which can yield early warning data;
- Endeavoring to have key questions included in all studies related to early warning topics, so that the key data for those indicators are collected more widely and so that the results from diverse studies may be more reliably compared;
- Striving to streamline analysis to the extent possible. This may involve eliminating variables, as well as substituting more predictive indicators; it may mean devising a simplified coding format for data; it may entail experimenting with different analytical techniques in order to discover those that are most readily adopted by other technicians.

These methodological innovations will require close collaboration among host government agencies and interested donors. It will not be enough to send a pro forma request for inclusion of a few items in an already prepared questionnaire. Effective collaboration will only occur with frequent contact, follow-up and technical assistance when required. The FFR can be instrumental in reinforcing linkages throughout the evolution of an early warning methodology.

The nature of the FFR's assistance to the EWU will depend on the number of technicians in the Unit and their level of training. In the likeliest instance, the Unit will be staffed by several young professionals having knowledge in specialty areas relevant to EWS but without much practical experience in applying that knowledge to famine warning. The FFR, therefore, will suggest ways in which particular expertise may be applied and will guide some of the staff through the application, as needed. In situations where the technicians do not have field research experience, the FFR will assist in designing field verification missions and will accompany the

technicians on a few of these missions to demonstrate the techniques as advocated in the office, and to assist his/her own field verification to support the Mission analyses. In this way--with practical advice and close personal contact--the FFR can transfer skills to the young professionals in the national agency while satisfying the FEWS need to locate and analyze available data. Where additional technical assistance is required, the Washington office and USG agency must be prepared to respond to Mission requests for additional input.

Once the FFR has become comfortable with the USAID-based GIS, he will demonstrate its analytical capabities and versatility to the EWU staff. This may lead to a formal request from the host government for assistance in installing a GIS in the EWU. For this reason, funds have been provided in the FEWS project for "a starter GIS" and for limited GIS training for EWU staff. Finally, the missions will be encouraged to assist host governments in developing a monitoring capability beyond the modest levels funded in this project by taking advantage of buy-ins through the project to provide additional training on equipment.

The foregoing has outlined AID's strategy for interfacing with, and helping to reinforce, host government early warning systems. How this strategy unfolds is discussed in Chapter VI (Project Implementation). What follows below is a description of famine early warning efforts on the international level and an AID strategy for working at that level over the next three years.

C. Early Warning in the International Community

1. Background

In referring to the number of actors trying to help famine-prone countries forecast their food shortages in 1986, a seasoned international official observed: "the stage was full to the bursting and, for lack of room, the actors were beginning to hamper each others efforts"[12]

The reasons behind the overlap of effort were understandable. The usefulness of the traditional cereal-balance surveys was being called into question on three scores: the aggregate-level information could not pinpoint when, where, and to whom aid should be given; cereal surveys provided little information on non-caloric deficiencies (lipids, proteins, vitamins); and, populations who had become at-risk "by non-food related factors (epidemics, depleted water supplies, population influxes), "which tend to destabilize a precarious balance and create the conditions of a serious food crisis despite theoretically adequate grain supplies."[13]

To compensate for the inadequacies of the cereals-balance surveys, a host of micro-level surveys were carried out in 1984-1987 to ascertain the roots of vulnerability, trace coping-mechanism sequences, and develop a set of famine signaling indicators. Groups such as OXFAM, Médicins Sans Frontièrs/AEDES, and FERU led the way in at-risk operational research and developed many important insights on: the nature of vulnerability, the costs of primary data collection in FEWS countries[14], the need for gathering timely data, and innovative methodologies for restricting data gathering to the most relevant geographic areas and time-frames. In spite of these very useful field exercises, however, a 1987 OECD appraisal concluded that it is virtually impossible to set up an early warning system relying on micro-level efforts because they, "tend to fall in the category of monographic studies rather than early warning systems. It is at the national level that early warning systems must be set up"[15]

Efforts to assist in setting up national level early warning systems require donor involvement at two levels: in country initiatives by local donor representatives in support of fledgling EWS, and headquarters level efforts which reinforce in-country strategies. The in-country FEWS initiatives were discussed in the previous section. What follows is a discussion of AID's role in early warning deliberations at the international level.

2. AID and International Collaboration on Early Warning Methodologies

Donor and international (including regional) agencies customarily exchange documents, data, and ideas on development related topics.

a. Exchange of documents

With respect to early warning issues, the flow of project documents has increased in the last few years as interest in the need for famine alert systems quickened in the international community. However, with the exception of two excellent appraisals by the OECD/Club du Sahel, there has been a notable lack of evaluation material in the dossiers circulated. This is unfortunate, given the number of early warning activities sponsored over the past three years, because it means that opportunities are being lost to learn from the experimentation of others. It also suggests that components of the "EWS wheel are being reinvented" in donor financed activities which run parallel to each other and entail an

unnecessary outlay of funds. Recognizing that all stand to gain from greater transparency on individual EWS approaches, AID will circulate this project document along with internal evaluation reports of FEWS activities during the 1985-88 period--as AID's contribution to a more frank discussion on "what works and what doesn't" in early warning strategies.

b. Exchange of Data

The exchange of early warning data on the international level has improved measurably in the last two years. This has occurred informally among the bilaterals and in a more structured way with the data that has emerged from the international agencies, regional networks and remote sensing agencies. Two serious constraints remain, however: the lack of data guidelines and the need to improve data transmission in real time.

Obtaining agreement on data standardization is difficult and time-consuming even, within a national context. Nevertheless, international early warning exercises could be significantly improved if those concerned with data transmission were able to agree on minimal formats and guidelines for data exchange. First, some agreement should be reached on early warning information needs so that data characteristics can be defined and the quality of supporting data specified. Next, agreement should be sought on transferring data in a pre-processed, non-aggregated form so that analysts can easily aggregate the data into their individual systems. Finally, there should be agreement on the need to have a full description of data formats and collection methodologies accompany all bulk data transmissions to facilitate use of the data by a variety of users. AID will work toward these goals in international fora during the course of this project.

With respect to real-time transmission, there are three levels of concern: transmitting data within African countries, between these countries and the regional agrometeorological and remote sensing centers, and between Africa and Europe/US. Satellite transmission--including the proposed "Diana" system which will use METEOSAT under the ARTEMIS project and the French/US financed reception and processing center at Niamey for receiving NOAA satellite data--will do much to overcome the problem of linkage between the Regional Center and Europe/US. The analytical functions being performed in Europe/US will be gradually transferred to Africa Centers and stations. This means that more emphasis should be placed on improving links between the Centers and the national states, and within these states. WMO is coordinating

the installation of three regional telecommunications centers in Africa--Niamey (AGRHYMET), Nairobi (with UNDP financing) and Harare (with Scandinavian funds). Half the funds from the World Bank's ICOMHA project are earmarked for upgrading national meteorological stations--including telecommunications capabilities. In addition, the Italian and French have underway extensive studies on how to improve and re-equip national telecommunication centers.

As can be gathered from the above, the problem of improving telecommunications in FEWS countries is under intense study by a host of international and bilateral agencies. Even though considerable financing has been earmarked to implement recommendations flowing from these studies, it is likely that a sizeable financing gap will remain. AID strategy over the next two years will be to (i) monitor more closely the rapidly evolving and somewhat crowded telecommunications sector and (ii) determine what technical assistance role, if any, AID might play beyond 1990 to help upgrade telecommunication's capabilities in FEWS countries. No capital investment is anticipated under the FEWS activity.

c. Exchange of ideas

Considerable improvement is needed, at the international level, on the exchange of pre-project ideas on early warning issues, approaches, and possibilities. Cross-fertilization can lead to an enrichment of individual donor strategies, more constructive dialogue with host governments, less duplication of effort, and cost savings. One might say that this kind of donor dialogue is best carried out at the field level by those most familiar with operational problems and possibilities. From the important perspective of "capturing field reality" this is true. However, there are other influencing factors which point to a need for better collaboration among the headquarters of agencies. In the first place, it is at this level that a composite picture emerges, out of individual country experiences, from which valuable lessons can be extracted for future programming. Secondly, pre-project thinking and design for experimental activities, like famine early warning, are usually done at the headquarters level-- even in decentralized bureaucracies. Finally, being in control of the budget process, headquarters tend to influence heavily the shape and thrust of new activities.

What is not needed in the effort to upgrade coordination is a "summit type" meeting on early warning topics. These highly structured meetings can be useful for launching new initiatives, but protocol, formality and the lack

of opportunity for real exchange constrain their usefulness in situations calling for sustained dialogue. What is needed is an ongoing process in which a core group of those active in international famine early warning meet at least once a year to discuss what approaches are beginning to jell--conceptually and operationally--and what steps should be taken, by whom and when, to move toward clearly articulated objectives. "Non-papers" should be circulated at the sessions reflecting the attendees' preparation for the meetings. Minutes, with follow-up actions spelled out, should be prepared and agreed to before the attendees return for their home destinations.

One of the first steps for the international early warning group will be compiling an inventory of active participants in the field (multilateral, bilateral, NGO, academic). This need not be precisely detailed in the beginning, for it will be augmented as the group's awareness expands. Next, there should be some indication of the special interests and/or comparative strengths of the various active agents vis-a-vis researching, planning and/or implementing early warning schemes. These profiles can also be refined in time. Early in the consultation process, a comprehensive "laundry list" should be drawn up of issues likely to constrain progress on government-donor early warning initiatives. A winnowing exercise should follow in which issues are categorized by severity and readiness to be addressed. This sorting out will lead to a focused and feasible agenda for group activity over a multi-year period. In time, agreement can be obtained on such issues as research priorities, the relative value of vulnerability indicators, preferred data collection techniques, etc.

An illustrative agenda for the international group would look something like this:

- The strictly methodological issues:

  - What types of early warning information are needed to facilitate the issuance of a credible "alert"?

  - What indicators of vulnerability are the best signals of pre-famine socio-economic-nutritional disintegration?

  - What innovative methods can be devised for micro-level data-collecting--taking into account spatial, temporal and funding difficulties?

  - What usable methodology can be devised for getting at the troublesome on-farm stock issue?

-- What approaches should be used in dealing with "official" and unofficial population figures and varying per capita cereals consumption requirements?

-- How can donor-sponsored development projects be "wired" to yield early warning type information? and,

-- Can color schemes on greenness maps be standardized so that the same color represents the same index value on FAO/NASA, AGRHYMET, and USGS maps?

o <u>The policy constraints related principally to decisions donors face on investment priorities</u>:

-- Improvement of the telecommunications system in the Subsahara is key to effective famine early warning. A myriad of uncoordinated studies are currently underway which will culminate in dozens of proposed telecommunications schemes for implementation in 1989-94. How will issues such as compatibility, feasibility, and redundancy be handled?

-- Is there a critical mass of donor funding required for special micro-level data collection (supplementary to "regular" data collection) to mount an effective early warning system in famine prone countries?

-- How much funding should be earmarked for early warning research, in what areas?

-- What promise does "water balance" modeling offer in significantly upgraded crop forecasting? Several models have been developed which simulate plant water economy. What are the results to date? Are these efforts adequately financed?

o <u>Some of the institutional issues would be</u>:

-- What configuration of host country and donor arrangements have proven most effective for early warning purposes in famine-prone countries?

-- What cost-sharing arrangements are feasible among donors for financing costs involved in getting the early warning units "off the ground"?

-- What additional donor efforts are needed to improve linkages between regional agrometeorological stations and national agencies?

-- What steps should donors take to assure the success of downloading high tech functions from Europe/U.S. to regional networks in Africa?

-- What steps should be taken to prevent counterproductive overlap in internationally financed programs: (e.g., the FAO/WHO/UNICEF Nutrition Program and the IBRD's Social Dimensions of Adjustment--both of which have implications for early warning efforts).

The most significant "institutional" issue relates to the <u>interrational community's willingness to support a global famine early warning system managed by an international agency</u>. The FAO sponsored GIEWS system has been in operation for over a decade. The GIEWS system is scheduled for augmentation by ARTEMIS in July/August 1988, adding a new capability for crop condition assessment. The GIEWS/ARTEMIS capability can be shared, giving AID access to a more complete data source for analyzing vegetation condition at the regional level.

The types of data being prepared by ARTEMIS are focused on the physical indicators (METEOSAT estimates of rainfall and number of rain days; NOAA AVHRR vegetation index data; all at 7.6-km grid with 10-day and monthly summaries). These data relate to crop condition and will not enhance socio-economic monitoring of at-risk populations. But this should not be allowed to obscure the <u>potential contribution</u> from the types of data that ARTEMIS or similar systems plan to distribute. By assembling physical indicators--agrometeorlogical and remote sensing--in one "laboratory setting", insights can be obtained on the potential for severe food shortages in FEWS countries. FEWS plans to coordinate with FAO to jointly use ARTEMIS data, where feasible and practical. Furthermore, once the consolidated interpretation methodology is worked out, it can be devolved to regional agrometeorlogical networks in Africa--a smoother transfer than is likely to result from the current diffusion of interpretation centers.

The inability of using ARTEMIS-type data to come to grips with the people at-risk issue will not, of course, be the fault of the system since ARTEMIS was not designed to yield socio-economic data or analysis. By the same token, FAO's slowness in developing vulnerability assessment methodologies

should not be used as an argument against supporting the emergence of an international famine early warning system. No bilateral or multi-lateral agency has had noteworthy success in developing these methodologies. For good reason, perhaps, because these methodologies can be developed only to a point in Rome--or Brussels or Washington. The basic work on vulnerability assessment must be done in FEWS countries under donor-supported government early warning systems. Given the physical terrain to be covered, the state of data collection/analysis systems, and the limited availability of funds--governments, donors and international agencies cannot afford to work "on their own" when it comes to compiling and analyzing data for vulnerability purposes. Recognizing this, AID is prepared to enter into collaborative arrangements, designed to improve vulnerability assessment techniques in FEWS countries.

With respect to the GIEWS/ARTEMIS issue, AID recognizes the usefulness--from the standpoint of effectiveness and cost savings--of an internationally supported famine early warning system. Consequently, AID will work closely with FAO, over the next few years, and draw on the GIEWS/ARTEMIS system to supplement AID's famine monitoring system. Funds have been provided in the project for the purchase of data which can be used for access to ARTEMIS data as that facility comes on stream. While it is true that the USG must maintain an independent assessment capability--as a major food donor--it is in AID's interest to have access to an internationally supported and credible early warning system.

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The Project Design Team conferred with representatives from donor and international agencies during the drafting of the project paper. Each of these representatives stressed the need for more coordination on early warning issues within the international community. As one put it, "Even among the European group, we are not sufficiently aware of what each is doing."

Upon approval of the FEWS project, AID will communicate its willingness to participate in a more structured, international consultation process. Once agreement has been obtained on the desirability and arrangements for the collaboration, AID will become actively engaged in pursuing the strategy outlined in this section.

It is not anticipated that the international group on early warning would have to continue to meet beyond the three year period of the FEWS activity. Either of two things will happen.

The sessions may yield little real agreement on early warning issues because of the intractability of the issues, or an unwillingness of some delegations to shed strongly held views. If, after a suitable period of structured dialogue, it becomes clear that little of practical value has emerged, AID should be prepared to "cut its losses"

On the other hand, the international sessions may prove productive with real yields on commonly endorsed procedures and strategies for improving famine early warning techniques In this instance, the group's "clearing-the-way" for useful collaboration, at the FEWS country level, will have been accomplished, the agreed-on approaches can be devolved to donor field offices and the international group dissolved. Of course, some early warning issues will remain for treatment at the international level, but these can be handled conveniently at International Conferences on Food Security.

IV. SUMMARY COST ESTIMATE AND FINANCIAL PLAN

A. Budget Issues

The major budget issues parallel the principal questions which had to be resolved in the selection of the design of the organization of the project. Having rejected the traditional-minimalist approach to early warning as unworkable and near-total reliance upon host-government, regional or international systems as premature, the issues then became those of choice of the mix of technologies and relative concentration of personnel, between the U.S. and the field.

Table 1 presents the summary budget which includes the following major items for the three-year $9-million project excluding $3-million optional mission buy-ins:

- $2,809,800 for field-based personnel and activities;
- $1,460,200 for U.S.-based analysis and support contractor personnel and activities;
- $1,480,000 for purchases of technological support and information (from U.S. Government and official international sources) including project evaluation and donor coordination;
- $250,000 for equipment including software (Annex F);
- Emphasis upon the field for analysis in addition to data collection (from secondary sources) plus the major situation reporting responsibility will require better-trained FEWS field representatives plus additional equipment, mobility and local-hire staff.
- $52,800 for new equipment and software for helping to reinforce host government EWS systems in drought-prone countries when/if opportunities arise;
- $60,000 for international coordination (working with other international donor and regional agencies). This is additional to the support implied in the purchases of FAO/ARTEMIS data and information budgeted at $300,000, LOP;
- $150,000 for project evaluation during year 2;

- The project design recommends a possibility for mission buy-ins through the principal contractor, USG agencies or other contractors as appropriate for equipment, training and technical assistance in support of host-country (or other) data generating, analysis and early warning system development. These are budgeted at $3,000,000 for the three years.

B. The Detailed Budget and Financial Plan

This is a wholly AID-funded, AID/W project with mission buy-in options for supplementary support and training to enhance host country early warning capability. The three year, life-of-project funding requirement summarized in Table 2 anticipates contractor-team operations and field representatives engaged on the project starting date. The U.S.-based contractor team and FFRs will function for the full duration of the project. Most investment will be implemented in the first year; it is principally for equipment. There is provision for some replacement and augmentation in the latter two years.

The project envisions a variety of services as project inputs to be provided by AID/W, other U.S. Government agencies, international organizations, and the principal contractor including field representatives. The contractor will be responsible for management and logistics of the U.S.-based team, the field representative and purchases of data equipment; that is for almost all of the inputs from commercial sources.

TABLE 1

SUMMARY COST ESTIMATE

Personnel		
U.S.-based		$ 708,820
Field		1,098,000
Subtotal		$1,806,820
Services		
Official Technical Support		$1,480,000
of which: U.S.G. Services	$970,000	
Data and information	300,000	
Donor/Regional coord	60,000	
Evaluation	150,000	
Communications		60,000
Operational Support		150,000
Expert Consultants		90,000
Subtotal		$1,780,000
Field Support		$964,800
International Travel		$294,970
Equipment, maintenance and software		$250,000
Other		$903,410
PROJECT TOTAL		$6,000,000
Mission Buy-ins $3,000,000*		
GRAND TOTAL		$9,000,000

*Note: Mission buy ins would include technical assistance for Host country EWS development and support, training in analytical and GIS procedures, technical assistance to host country data collection agencies, equipment, and additional FFRs or other operational support staff.

TABLE 2

DETAILED BUDGET

Category	Year 1	Year 2	Year 3	Three Yrs Total
A. Personnel (Salaries and Fringe)				
a. U.S. Based Management and Analysis Center:				
Project Director (50% Time)	25,000	26,000	27,000	78,000
Social Scientist/Field Coordinator	40,000	42,000	44,000	126,000
Agroclimatologist	35,000	37,000	40,000	112,000
Editor/Translator	30,000	31,000	33,000	94,000
Program Analyst	35,000	36,000	37,000	108,000
Clerk/Secretary	20,000	21,000	22,000	63,000
Fringe Benefits (22%)	40,700	42,460	44,660	127,820
Subtotal for U.S. based personnel	225,700	235,460	247,660	708,820
b. Field Representatives				
Six Field Representative @ $40,000	240,000	240,000	240,000	720,000
Six Local Hire Counterparts	60,000	60,000	60,000	180,000
Fringe Benefits (22%)	66,000	66,000	66,000	198,000
Subtotal for Field Personnel	366,000	366,000	366,000	1,098,000
Subtotal for all Personnel	591,700	601,460	613,660	1,806,820
B. Field Support				
Housing for six Representatives, @ $20,000/year	120,000	120,000	120,000	360,000
Communications, @ $1000/month/rep	72,000	72,000	72,000	216,000
Supplies, @ $600/month/rep	43,200	43,200	43,200	129,600
In-country travel, @ $1,200/month/rep.	86,400	86,400	86,400	259,200
Subtotal for Field Support	321,600	321,600	321,600	964,800
C. International Travel				
Six Field Representatives:				
Two RT per year, @ 4,500	54,000	54,000	54,000	162,000
Moving Expenses, @ $3,000	18,000	0	18,000	36,000
Coordinator: 3 RT, @ 5,000	15,000	15,000	15,000	45,000
Other Staff	17,320	17,320	17,330	51,970
Subtotal for International Travel	104,320	86,320	104,330	294,970

TABLE 2

DETAILED BUDGET

Category	Year 1	Year 2	Year 3	Three Yrs Total
D. Goods and Services, Commercial				
Communications	20,000	20,000	20,000	60,000
Operatonal Support	50,000	50,000	50,000	150,000
Expert Consultants	30,000	30,000	30,000	90,000
Subtotal for Goods and Services	100,000	100,000	100,000	300,000
E. Equipment (See Annex F):				
GIS, Computer hard and software	150,000	75,000	25,000	250,000
F. Other Indirect Costs (50% of A)	295,850	300,730	306,830	903,410
G. Goods and Services, Official				
USG Technical Services	370,000	280,000	320,000	970,000
Data and Information (FAO/ARTEMIS)	100,000	100,000	100,000	300,000
Donor/Regional Coordination	20,000	20,000	20,000	60,000
Evaluation	0	150,000	0	150,000
Subtotal	490,000	550,000	440,000	1,480,000
H. PROJECT TOTAL	2,053,470	2,035,110	1,911,420	6,000,000
I. Optional Mission Buy-ins:	1,000,000	1,000,000	1,000,000	3,000,000
J. GRAND TOTAL	3,053,470	3,035,110	2,911,420	9,000,000

V. TECHNICAL ANALYSIS

A. Modeling Famine

Famines are complex social events resulting from the interaction of both physical and political phenomena. No universally approved theory for famine causation exists to allow a comprehensive conceptual or computer model to be constructed. However, various promising strategies for making use of limited computer modeling in early warning systems are available. FEWS has made use of the computer-assisted analyses but it is unlikely that a concise comprehensive model will be adopted in the foreseeable future.

Nonetheless, an explicit conceptual framework of the famine process, is needed by FEWS in selecting "indicator" parameters and for identifying critically anomalous behavior in these parameters. In the absence of such a model, the system's analysts employ an implicit conception of the process of evolution of famine. A variety of objective and subjective data are combined--to yield an increasingly reliable understanding of the phenomenon being monitored. For example, a computer can map the rainfall isohyets between 200 mm and 600 mm level for a given region. Because the maps of the geographic information systems (GIS) can equally well display the spatial characteristics of other phenomena, areas where critical parameters overlap can easily be identified. Thus, for example, a map showing a population with high morbidity rates, incidence of measles, malnutrition etc, in a millet producing zone which requires about 500 mm rainfall could be identified as vulnerable and at risk under even mild drought conditions (350 mm rainfall). This convergence of indicators signalling the location of a problem zone will provide analysts with objectively identifiable criteria calling for further investigation or action.

FEWS will continue to employ a methodology of this type. The initial problem was to identify the kinds and importance of data which can be obtained in the difficult circumstances of the target countries. Generally, many of the parameters have already been identified. These will be discussed in the following sections. FEWS will continue to work on its heuristic model of relationships between the various components of the food production and distribution system, including parameters for governmental and economic data. Continued accumulation of

data, reflection and retrospective analysis and predication will eventually yield a base of knowledge as well as data which will constitute, at a minimum, a working conceptual (implicit) model of the famine phenomenon.

B. The Feasibility of Using Agroclimatic Information in FEWS

Agroclimatology which deals with the relationships between climate and agricultural production, can make an important contribution to famine early warning systems. Agroclimatological measures include weather variables such as surface temperature and rainfall; observed and derived soil moisture, crop area, growth stage, condition, and yield assessments; and remotely sensed indicators of land surface and atmospheric characteristics such as vegetative biomass or cloudiness.

The primary use of agroclimatological information in a famine warning system is to provide early indications of the magnitude and location of crop production declines and of stressed pastures which might trigger livestock losses and human migrations. The goal is to make production estimates as soon as possible and to use them to focus on critical regions and vulnerable populations. There is a fairly extensive menu of agroclimatological indicators that might be gathered, purchased or otherwise derived by FEWS. Currently the major types of data are: (a) rainfall station data, (b) remotely sensed data, (c) agriculture statistics and (d) irregular reports of local surface conditions provided by a variety of sources. Other Early Warning Systems such as the FAO Global Information and Early Warning System (GIEWS), use very similar agroclimatological information. Most international and national systems use station rainfall and field monitoring of crops to provide early warnings of crop deficits. There is increasing interest in the use of soil moisture balance and crop yield models and in the use of remote sensing products for early warning and crop monitoring purposes.

FEWS should continue to use most of the agroclimatological indicators that it currently selects. Two issues are critical in making better use of this information. The first is the importance of a geographical context for interpreting the indicators. The interpretation of agroclimatological measures can be more accurate and efficient if a country is clearly differentiated according to land uses and soils. The most important distinctions for famine early warning are those between irrigated and rainfed crops; food, export and non-food growing regions; droughty and moisture holding soils; and crop, pasture, forest and unused land uses. Less than 10 percent of the area of most FEWS countries is used for crops and even

pasture is less than 50 percent of the land area in most countries (see Annex E1). FEWS should make an attempt to collect such information in a baseline fashion. Using published maps and other resource surveys to set up cartographic and statistical data bases on the basic physical and agricultural geography of a region identifying major soils, land use types and crop areas. Land use and crop area maps can be fairly general because it is impossible to capture in detail the tremendous heterogeneity of African land uses with small fields, intercropping, different types of irrigation, agroforestry and agropastoralism. In the following discussion of specific indicators it should be noted that FEWS is monitoring rather than forecasting agroclimatological conditions.

Regional Climatology. There are key atmospheric disturbances that can be used as early warning indicators at a large, almost continental scale. For example, the position of the intertropical convergence zone (ITCZ), which marks the northward movement of the rains in the Sahel, can also give a few weeks warning of a delay in the rains and of subsequent production problems at a regional scale. The position and progress of the ITCZ will be incorporated into FEWS as the first indicator of rainfall problems (recognizing that the location of the ITCZ at any point in time cannot reliably be employed as an indicator of its future location). The ITCZ is usually plotted from qualitative interpretations of METEOSAT satellite cloud images, and from synoptic meteorological station observations available on WMO's global telecommunications system (GTS).

Rainfall. Station rainfall data are probably used more often than any other measure in existing famine early warning systems. Although there are many meteorological stations in Sub-Saharan Africa all do not report data on a frequent and timely basis and the density of reporting stations tends to be lower in the famine prone desert margins of the Sahel and in areas remote from administrative centers. The reliability of the data, the density of the station network, and the publication delays vary greatly by country. AGRHYMET is trying to coordinate and facilitate the improvement of agrometeorological services in West Africa but cannot currently be considered a timely source of information.

Although some people have suggested that an expansion of the synoptic station network, would greatly assist in early warning, greater payoff may be found in the refinement of rainfall estimation procedures based on satellite cloud images and in the upgrading of existing meteorological stations. FEWS should take advantage of the information available from the METEOSAT satellite and use it to confirm and interpolate station rainfall data.

FEWS should also try to obtain reliable estimates of the beginning of effective rainfall in each country as this date is critical for the agricultural calendar and for some soil moisture available from agricultural and field agents in most countries and can be checked against other weather and satellite data.

Hydrology. Irrigation is important in many FEWS countries, perhaps not in area, but in contribution to national food security. Hydrological indicators in the form of abnormally low reservoir, river or lake levels may give very early warning of potential problems (see Annex E 1). In those countries where irrigated and recession agriculture is important such hydrological early warnings can be derived from data provided by national hydrological services, river basin commissions, and field projects.

Remote sensing. The last five years has seen a major advance in agroclimatological monitoring in Africa in the form of satellite remote sensing. The great advantage of satellite imagery is that it provides comprehensive spatial coverage, filling in the gap between meteorological stations and giving general indications of environment and vegetation conditions in advance of ground observation.

The NOAA Advanced Very High Resolution Radiometer (AVHRR) measures the energy reflected from the earth's surface in several wavebands. It provides daily coverage for most of the earth's surface and the digital information obtained by the satellite can be received as the satellite passes overhead or by the retransmission of recorded data to central receiving stations. Although there are several satellites, such as LANDSAT and SPOT, which have much higher resolutions, it is generally agreed that the NOAA AVHRR and METEOSAT are the most cost-effective sources of daily, large-area remote sensing information.

Since green vegetation absorbs red sunlight and reflects near- infrared radiation the presence and growth of vegetation can be identified by comparing the relevant spectral bands of satellite data. The most widely used AVHRR measure is the Normalized (Difference) Vegetation Index (NVI) which indicates biomass vigor and can be used to track vegetative development during the growing season. The existence of a five- to seven-year archive of the index means that comparisons can be made to previous years using difference maps and graphs for particular locations. Despite some of the problems in using and interpreting the NVI it is clear that NVI maps, in particular, are playing a role in FEWS and should continue to do so. The maps help to target areas where drought may be developing, and

stimulate more detailed analysis and field observations. The reported improvements in precipitation estimation procedures based on METEOSAT images, although not as developed as NVI, should also be part of FEWS because these techniques allow for estimation of rainfall between the sparse station networks of Africa. These estimates should be compared to station reports and the NVI used within FEWS in order to build confidence in the value of METEOSAT in an early warning system.

It is important to recognize the problems in the use of remote sensing information if satellite imagery is to be a credible component of FEWS. These limitations should be made clear in the communication and interpretation of the NVI indices and maps. Remote sensing and NVI's are most appropriate where agricultural regions are uniform and woody vegetation is low. Subsaharan Africa, with small, scattered fields, growing several crops amongst small woody shrubs, is one of the more difficult environments for interpreting ground cover. It is in this type of environment, more than any other, that ground truthing is important.

Agriculture. Planting and replanting dates are important in the same way as the date of the onset of the rains in that they signify the beginning of the agricultural season and can indicate serious delays which may result in eventual production deficits. FEWS can usually obtain this information from agriculture departments. The date and initial magnitude of the rains, combined with information on planting and replanting dates should be highlighted in FEWS reports and the qualitative implications for crop production presented based on an understanding of the normal crop calendar in each region.

There are several routes to monitoring crop conditions once the growing season has begun. Direct field observations of the crop and pasture conditions can play an important role in early warning efforts. Currently, FEWS field data are collected from agriculture departments, from NGOs, and from observations taken during field trips. In the future, the within-season crop monitoring is likely to improve in most countries with the assistance of programs like the CILSS' Diagnostic Permanent. In some cases, the GIS and computing capability of local FEWS may be able to help with the organization, analysis and publication of these data, although most agriculture departments are already receiving assistance from several donors.

In most countries, the government agricultural statistics service will produce a production estimate just before harvest and a final crop assessment several months later. In certain countries the political sensitivity of production estimates result in considerable delays in the publication of reports, and

debates about the credibility of the information. In many countries the focus of data collection is on cereals even in areas where roots or vegetables are important. Agricultural services also try to report on pasture conditions and other aspects of livestock production but as with other measures, the timeliness, spatial coverage and reliability of this information varies between countries and is generally not useful for famine early warning. For the near future, FEWS, like other early warning systems, will probably have to rely on delayed cereal production estimates, and sparse information on other food and livestock.

The importance of the qualitative assessments of farmers and extension agents should not be underestimated since they often have the experience to make good intuitive judgments of crop and pasture prospects. The challenge is to find ways to survey and summarize these assessments. FEWS should continue to collect direct observation data for its own importance in early warning, and as a cross reference for remote sensing, meteorological and model estimates. Information on the progress of the crop calendar and phenology (e.g. germination, flowering dates) is also very important as it helps in the interpretation of other indicators such as water balance indices.

It is important to recognize that rainfall is not the direct agroclimatological determinant of crop and pasture conditions although it may be the easiest to measure and interpret. The moisture available to plants is also dependent on other variables such as temperature and winds which are collected by meteorological station networks. These data are collected but are rarely used as part of the drought or agricultural production early warning estimates. AGRHYMET is encouraging the use of agrometeorological data to construct soil moisture balances and water deficit indices using an FAO methodology, but these too are not routinely used to make early warnings. The FAO method compares the water needs of crops at various stages to the water available (see Annex E1). The FAO method is the most widely accepted moisture budget procedure in Africa and is the most appropriate index for FEWS to use. However, it does have flaws and is not the only method available. Although these indices integrate agroclimatological information and provide a sound scientific basis for monitoring the growing season, it is not yet clear that these indices add much value over simple rainfall statistics in early warning efforts. Since the indices are somewhat expensive to compute, FEWS should use indices available from outside sources (FAO or government departments) rather than take the time to compute them independently.

Crop yield models, based on early season agrometeorological data, have also been used in early warnings of production deficits. Because of the wide variation in crop types and environments, there is no likelihood of a theoretically comprehensive universal model that can provide regular, timely, regional forecasts. Because good historical time series are not available and, e.g. cropping patterns etc., are not well identified in most of Africa, the utility of crop yield models in the near future for early warning systems is doubtful. Nevertheless several groups including NOAA/NESDIS and the ESPACE project have produced operational yield forecasts that some decision makers and scientists find useful (see Annex E1). Because of the credibility problems, and because crop yield modeling may not be cost-effective across broad regions, FEWS should not devote a lot of resources or time to crop yield models. If yield forecasts are made easily available by FAO or AGRHYMET, the information should be cautiously compared to other indicators and to field observations and, if credible, eventually incorporated as an indicator.

C. The Feasibility of Using Socio-economic, Health, and Nutrition Indicators in FEWS

Famine is most simply defined as widespread starvation. It also denotes a process of immiseration, of decapitalization of families and of their deepening impoverishment. In fact, famine is largely a problem of the poor, those who have fewer resources and entitlements and who are already on the edge of subsistence consumption. Thus, famine, like poverty, has many underlying causes--environmental degradation, overpopulation, perverse national agricultural policy or civil war. Under these circumstances, whatever the triggering cause, there comes a time when people can no longer cope, and systems of mutual support and of food distribution break down under the accumulated pressure. Famine then overtakes the area, spreading rapidly among the vulnerable populations.

People cope with decreasing access to food supplies in several ways. First, they attempt to obtain those resources that will enable them to obtain food. They turn to traditional trade networks. They migrate in search of seasonal employment. They sell small livestock and, finally, agricultural and household equipment. In other words, people seek solutions to their difficult situation in the marketplace--but they do so at the very time that market forces devalue their assets and greatly raise the price of foodstuffs. Caught in this economic scissors, people resort to a second set of coping strategies that more directly address their problem. They forage for wild foods, they reduce the portions at each meal, and they ultimately reduce the number of meals, all of which increase their susceptibility to disease.

This scenario of coping behaviors underlies the usual set of socio-economic and nutrition indicators that can be used in famine early warning systems. People can be asked about their sources of additional incomes: employment, livestock sales, sale of artisanry and of farm products, charity and external aid. (Remittances and family food stores are omitted from most questionnaires because people do not answer forthrightly.) Key informants can assess the extent of seasonal and permanent migration and trained enumerators may keep track of market prices, usually just one cereal staple and one meat product.

Dietary and nutritional studies can verify the extent of vulnerability, but are less commonly carried out. People can be asked about their principle staple for the preceding day or week and the source of this staple. More detailed questions can cover the average number of meals eaten, the proportion of famine foods in the family diet, and the portions allocated to each family member. Finally, some monitoring programs include a nutritional status index, usually a weight-height ratio for children under five years of age, which can be compared to an international standard.

The FEWS model must limit the number of variables monitored and establish standardized criteria for the indicators selected. In health, for example, information will come from many different sources: clinical appraisals, dietary surveys, anthropometric evaluation, laboratory assessment of nutrition status, and physical examination. The compilation of these secondary data, their evaluation and their processing require specialized personnel. (Health and dietary indicators of nutritional status available in primary care and pediatric wards, government statistics and primary health services will often be hard to interpret since a majority of cases may not be reported.) Once the set of critical indicators is selected and defined for each country by the FFR in consultation with the contractor's specialists at headquarters, FEWS will be able to contribute to the development and use of socio-economic and nutritional monitoring for famine early warning. At the same time, the FFR must prioritize his efforts: emphasis must always be given to the collection and analysis of timely indicators that are accessible at reasonable cost.

Socio-economic and nutritional monitoring for famine early warning would systematize data collection and analysis to enable more controlled comparison over space and time. A model system, compatible with a geographic information system, would comprise a sample of villages along widely spaced transects that cross-cut ecological and production zones. Questionnaires could then be administered periodically to the same respondent families over time to develop norms for each indicator,

controlling for seasonality, production system, social class and other factors. In this way, anomalous patterns would be identified by comparing current data with the norms, and at the same time the extent of local food needs could be more precisely defined.

This ideal is attained nowhere on the continent. At present, FEWS FFRs collect what little production and consumption information relevant to famine warning is available from official sources. For a comparative baseline, information on the demographics, production systems, land tenure (e.g., average land holding), and the infrastructure of an area provide a minimum context for interpreting current patterns. In addition, the baseline must incorporate historical data on all the other relevant topics. These include production data, prices for cereals and livestock, and information on migration and unemployment at a minimum. In addition, epidimeological and nutrition information, where timely and available, will provide important corroborating evidence. By using available information only, however, socio-economic and nutritional concerns are at best sporadically incorporated into EWS--even the most sophisticated system employs nutritional surveys only in cases of probable extreme need, which enables verification of current conditions but not the compilation of the comparative baseline that is needed in a GIS.

The possibility of moving beyond such haphazard data collection depends very much upon the present state of each country's national EWS. There are, in outline, three types of EWS: at the most rudimentary, a government agency calculates a national food balance sheet, with little or no field verification; an intermediate stage involves reporting local social and economic conditions through the administrative hierarchy; a more sophisticated system adds socio-economic and nutritional surveillance in those villages identified as at-risk.

In all systems, the FFR must strive to standardize and systematize the socio-economic and nutritional data that are now collected for famine early warning and to extend the range of data that are gathered. The most elementary step, to resolve the incompatibility of the multitudinous studies undertaken by government and its donor collaborators, is as difficult as it is simple. In every country there are numerous studies underway with little or no real coordination. The need is to define a small number of pertinent background and substantive questions to be included in such studies, so that the results of each can be systematically compared to those from other studies. Also, knowledgeable local informants--merchants, truckers, school teachers, health clinic workers--can respond to carefully phrased questions about their area. The key here is to define the pertinent questions for each type of respondent and to ask those questions in the same manner of each individual.

These innovations will help standardize data collection but cannot systematize it. Where, however, a national agency already coordinates systematic monitoring through an administrative reporting system, FEWS can go beyond standardization of data collection and strengthen the agency's capabilities. FEWS can assist in the construction of questionnaires, the collection of data, its analysis, and archiving. FEWS can help introduce systematic sampling procedures. And, FEWS can help strengthen the national reporting system, either through training of personnel or through experimenting with local reporters resident in the villages of the vulnerable areas. Such more elaborate systems will likely be limited to those national agencies that combine administrative reporting with independent field verification.

In summary, the FEWS project can facilitate the research necessary to refine socio-economic and nutrition systems at the same time that it helps strengthen national surveillance agencies. The activities that can be undertaken include: systematization of sampling procedures, refinement of research instruments, training of field workers, and streamlining of analyses. With appropriate evaluation of procedures, the project can assess which techniques and approaches work best under specified circumstances, and recommend these to other agencies. In this way, the FEWS project will not only serve its major goal of early warning, but also it will help institutionalize this effort in national governments, who are ultimately responsible for the care and welfare of their people.

The FEWS methodology will entail collection, archiving and monitoring of some combination (depending upon availability in the respective target countries) of some or all of the following indicators and possibly others:

<u>Socio-economic</u>
populations
migrations
incomes
markets
prices
production
trade
diet
trade
nutrition
epidemilogy
land use
transhumance

<u>Agroclimatological</u>
weather forecasts
hydrology
onset of rains, ITCZ
cloud cover
rainfall, observations & estimations
crop cycle (plantings, etc.)
crop conditions (moisture)
phenology
greenness measurements
crop predictions

These parameters will be monitored on the most comprehensive, structured and timely basis possible. They are the raw materials of the data system; the analysis of their collective import then becomes the basis for FEWS assessment of conditions and early warning.

Convergence of evidence. None of the indicators described above can stand as an independent early warning indicator because each indicator has limitations in spatial coverage, timeliness, accuracy and significance. No one measure can be independently relied upon for famine early warning. Eventually, with a long enough historical record (probably at least ten years) and careful statistical analyses, one indicator may be shown to correlate so closely with the magnitude and location of severe production problems that it could be used as the "leading" indicator. In the meantime, FEWS needs to collect the variety of indicators described above, use them to check one upon the other, and then evaluate them through field observations and end-of-season analysis of their relationships to at-risk conditions. As FEWS analysts gain skill in interpretation of the indicators in the context of the historical archive and geographic resource base, and as the growing season progresses, crop conditions become clearer and field observations begin to confirm earlier indicators, a real convergence of evidence will produce more confident warnings of potential famine conditions.

D. Information System Strategy

1. Information system

A geographic information system (GIS) will greatly facilitate the manipulation of disparate physical and socio-economic data. GIS is simply a generic term for an information system in which data are recorded spatially, according to latitude and longitude. An advantage of a GIS is that it allows spatial analyses for cartographic presentations of complex results to the FEWS audience: the reader can literally see how trends pattern over space. It helps to extract more information from data (e.g., spatial patterns) and facilitates the integration of data in ways implied by the convergence of evidence methodology, (e.g., map analysis). GIS presupposes the availability of reliable data to obtain credible results, just as it imposes certain technical requirements, such as where particular tasks can be carried out.

2. Data base requirements

It is usual to think of data requirements as two-fold: historical or baseline data that establish the norms for a particular place, and current data about those conditions that, when compared to the baseline norms, permit determination of abnormal situations. Clearly, a GIS is only as useful as its baseline and current data are reliable and complete.

The standard approach in designing a data base and an information system is: (a) to assess user information needs; (b) to define data types, levels of detail, and amounts of data necessary to satisfy the users' information needs; and then (c) to specify the models or analytic procedures for interpreting the data usefully. The project then collects those data in the amount and detail needed for analysis. In the present FEWS project, however, data collection depends largely on secondary sources. Consequently, different analytic models or algorithms must be designed for each country in accord with the types of data available, their completeness and reliability.

a. Data networking

Data networking is an essential chore of the FFR. Based on the experience of previous FEWS efforts in each country, the task of the FFR will be to evaluate, with responsible country and USAID officials, the types of data available and their reliability. The FFR will also review the existing FEWS data archive and prioritize entry of any additional data. In this work, the FFR will coordinate closely with the U.S.-based offices providing support for the effort. Further, he or she must balance efforts between building a baseline data base with what is required for current data and information needs.

The dependence upon secondary data requires that the FFR and AID encourage sharing of data in country among projects in order to build the data base. Interpersonal skills in networking will prove essential in this endeavor. The FFRs, often on an informal basis, must establish ties with those agencies that generate data. Once the GIS is operational in the USAID, the FFR will provide GIS technical support to agencies requesting it, in exchange for data. These linkages with the host-country, always desirable, are critical for FEWS.

The GIS also enables networking with other data providers and users at both the field and home office levels. For example, weather data from GTS and remote sensing data from NASA or FAO/ARTEMIS will be entered at the headquarters level with sharing to the field. At the same time, local data from

the departments of meteorology will be entered at the field and shared with the home office. As regional centers such as AGRHYMET attain the capacity to provide data services, linkages will be established via the GIS. Data linkages with development projects of AID and others will be facilitated through the information system.

In the U.S. efforts are also undertaken by the Food Needs Assessment Project out of the FVA/PPM office (Food for Peace) to collect commodity-specific production and consumption data for use in programming food aid. While this information system is useful to FEWS activities, it only reflects trends in production and consumption and is useful in forecasting food needs. It does not, however, attempt a convergence of data envisioned in a FEWS that reflects both macro and micro food availability and security concerns.

b. Maintaining the database: archiving and documentation

The current FEWS database is being archived and documented under a general set of cataloguing guidelines. The guidelines are being made more precise because as the database grows and becomes more comprehensive, adherence to guidelines becomes increasingly important. Careful documentation of coding procedures and the like will allow the database to be transferred from user to user with full understanding of what data are available, the field methods used in collecting the data, etc. This will serve not only FEWS' purposes for the best possible baseline and monitoring data, but other country programs as well.

Archiving of data will continue to follow strict standards and guidelines, including map registration, cataloguing, describing data sources, estimates of data validity, etc., which are prepared under U.S.-based technical guidance in conjunction with the field and home offices. As the process matures and other projects or host-country agencies participate in development of the data base, the FFR and the project can serve to train and guide their efforts in data collection and archiving.

c. Data analysis

FEWS must be flexible in its interpretation methods in order to derive maximum benefit from available data. In general, FEWS will use three approaches: trend analysis, convergence of evidence, and map analysis. Trend analysis evaluates changes in particular indicators over time. The time scale for such analyses can be relatively long--as for gradual

changes associated with basic causal factors such as land degradation, climate shifts, and population growth--or relatively short--as for episodal events such as weather, market prices, and guerilla incursions. The convergence of evidence approach involves consideration of the consistency in trends among multiple indicators of current conditions. This is, in essence, a technique for assessing the probability of distress. Finally, map analysis provides the tools to determine proximities, distances, and spatial concurrences among indicators and allows the integration of data variables through the overlay process. It also presents results of these multiple trend analyses in cartographic form, so that the reader may literally view the results in spatial context.

3. Implementation of the integrated system

An operational GIS requires different levels of analytic complexity and of staff expertise. Many GIS functions can be handled in the field. Other more complex or sophisticated operations, such as digitizing maps and merging data, are best done in a central office that has the requisite staff and equipment. The results are then provided to the field operators, who maintain and update the materials. In other words, although the eventual goal is to transfer all functions to the field once the GIS is mature, current technical and practical considerations require a three-level integrated system.

Table 3 identifies uses of GIS and identifies which of the three levels of facility would have primary responsibility for the operation. ('Field' denotes the FFR in country, 'home' the Washington office of the contractor, and 'USG' the U.S. government facility with the capability to carry out sophisticated functions.)

The functional components and uses of a GIS are detailed in Annex E-3. Here it warrants mention only that the field GIS must first be implemented in the USAID mission. Once that system is operational, the FFR can work with the appropriate national organization(s) for the transfer of the model to their agency also. Such a transfer would facilitate the FFR's networking for data collection at the same time that it builds institutional capacity in national agencies for famine early warning.

TABLE 3

ACTIVITIES OF FEWS COMPONENTS REQUIRING USE OF GIS

FUNCTION	LOCATION FIELD	HOME	USG
prioritize data input	x		
locate data	x		
digitize maps			x
register and merge complex map data			x
define interpretation models	x		
graphical display of remote sensing, data, and results	x	x	
conduct regional spatial analysis		x	
do complex spatial analysis		x	x
update guidelines for archiving			x
train other users-simple	x		
train field office		x	x
update system design			x
input tabular data	x	x	
conduct vulnerability analysis	x	x	x
agrometeorological assessment		x	x
coordinate data base other field users	x		
coordinate data base other donor capitals		x	x
conduct at risk analysis	x		
interface with relief programs	x	x	
provide minimal hard copy products	x		
provide publication hard copy products		x	
provide complex hard copy products			x
prepare report text	x		
prepare report graphics and duplication		x	

NOTE: The home office will have the field plus additional capabilities. The USG will have both field and home office capabilities plus additional capabilities.

E. Financial Analysis

In most projects, there are several design configurations which could be opted for in implementing the project. The purpose of the financial analysis is to find the alternative which experts determine will satisfy project requirements at the least cost.

As discussed previously (II.3.C) the design team examined five possible project configurations: (a) a traditional early warning system; (b) a system based upon expansion of extant information sources; (c) dependence upon improved host country capability; (d) a separate AID system and (e) a combination of all of the above.

There are three key factors to be considered in gauging effectiveness under the FEWS project. First, which of the alternative systems is most likely to provide the most relevant data over and above what is currently available. In this connection, one could opt for the most effective early warning system--from a theoretical standpoint. Given the state of information systems in FEWS countries, this option would undoubtedly call for a vast outlay of funds to support thousands of monitoring staff covering millions of square kilometers of land. This option is not feasible, however, given current constraints on financial availabilities and, consequently, no real attempt was made here to quantify the financial implications under this option.

The second key factor in assessing FEWS effectiveness is the requirement that the data analysis/assessment function be carried out primarily in the field--rather than at the headquarters level. This necessity has been agreed to within AID as a result of experimentation carried out over the past few years.

The third factor relates to the level of personnel, equipment and support required to implement an information system which will get the AID early warning task done--in a cost-effective manner. The project needs the right combination of technical people, in the right places, with the means to collect, analyze and transmit information. The project has to rely principally on data, which others collect, usually for purposes not directly related to early warning objectives. FEWS must have people near the sources of data in order to identify the best data available and to access those data expeditiously; this implies at least one specialist in each FEWS country. Consequently, field analysts are a sine que non for an effective early warning system. At the same time, technical, managerial and reporting personnel are needed in the U.S. to backstop FEWS

field operations. It is the size of this backstop group which becomes the "swing" factor with respect to minimizing costs. Although it would always be desirable to have additional analytical talent, it is considered feasible to achieve the project purpose with a minimum core of U.S.-based personnel--as called for in this paper.

While the current funding is adequate for project purpose attainment, additional funding would permit more research, more extensive field monitoring and the possibility of more rapid development of EW systems.

COST COMPARISON OF ALTERNATIVE PROJECT DESIGNS
$000

Analysis	Enhanced Centralized Analysis	Field
U.S. Operations	2,130	1,460
Field Operations	2,810	2,810
Equipment	250	250
Tech Services	1,480	1,480
TOTALS	$6,670	$6,000

The design with the "field analysis" configuration is thought to be the minimal effective requirement. The "centralized analysis" configuration calls for six analysts in addition to those incorporated in the minimalist model--assuming *ceteris paribus* for other cost factors.

F. Recurrent costs and devolution

As long as the United States is a major donor of food to poor countries, a means will be needed to verify that donated food reaches the vulnerable groups for which it was intended.

At times, in carrying out the verification task, heavy reliance can be placed on local information systems to determine where vulnerable groups are, how much food they need, and when it should arrive in-country. In these country situations, where the data collection and analysis capabilities are sound, there is little need for a "FEWS" type activity. A selective monitoring of the local early warning (i.e., planning) and food delivery systems usually suffices to meet U.S. requirements.

In other countries, however, data-collection and analysis systems are still in a formative stage. Such is the case, to a greater or lesser extent, in the FEWS countries. Even though considerable efforts are being made in these countries to strengthen information systems, the sorting-out of sometimes-difficult-to-read vulnerability data will remain a government-donor preoccupation for at least several more years. During this sorting-out period, and while regular line agencies (health, agriculture, statistics, etc.) are being up-graded, a famine early warning unit (EWU) must be supported within the government structure of the FEWS countries. After early warning concepts and methodologies have caught on in these countries, the functions of the EWU can be absorbed within the regular responsibilities of one of the planning arms of government (e.g., Department of Planning, Agriculture, etc.). Consequently, While "starter" support is provided in this project for host government(s)' early warning units, these units are seen as temporary but necessary entities. The FEWS project aims to institutionalize early warning concepts, methodologies, networks, etc. not the EWUs, as such. It is recognized, of course, that this task probably will not be completed during the three-year course of the FEWS project. If AID support for EWU's is required beyond 1991, it will be furnished from USAID budgets.

With respect to the need for an AID/W follow-on project to the 1989-91 FEWS activity, it is anticipated, under the three-year FEWS activity, that a sensitivity to the need for an early warning strategy will be internalized into the overall AID development strategy along with practical methodologies, tools and staff-arrangements to implement the early warning strategy. Thus, by 1992, the Agency will be able to assess famine potential situations using the regular development analysis process which will have been enhanced under FEWS. This will enable the Agency to work with host governments and other donors in effectively heading-off famine disasters.

At FEWS project end, the Mission early warning units will contain local-hire experts integrated into the Food Security Operations. It is anticipated that the unit will be able to be sustained for a modest cost/Mission of less than $70,000 per year.

TABLE 4

OPERATIONAL COSTS TO SUSTAIN AND DEVOLVE THE EARLY WARNING SYSTEM

	Budgeted			Conjectural	
	Year 1	Year 2	Year 3	Year 4	Year 5
U.S.-based personnel	$338,550	$353,190	$371,490	---	---
Field personnel	549,000	549,000	549,000	$120,000	$120,000
Information & Communications	200,000	200,000	200,000	150,000	150,000
Other	965,920	932,920	790,930	150,000	150,000
TOTALS	$2,053,470	$2,035,110	$1,911,420	$420,000	$420,000

G. Economic Analysis

1. Conventional economic assessment

The need for an early warning system to provide time to implement famine prevention measures is a universal humanitarian goal of unquantifiable value. The value of avoidance of famine-induced suffering and death is also a cost-benefit imponderable. There are, however, a variety of resource savings which can result from famine avoidance, such as the monies which would have been spent on famine relief campaigns and staff time which would have been diverted to pressing immediate needs which will instead be available for long-term development efforts. Consequently, there is no dispute that steps should be taken to prevent the occurrence of famine. For FEWS, then, the operative question becomes: what is the most cost-effecient means for achieving adequate early warning?

The informal "alert system" which prevailed in the early 1980's provided a least costly, form of early warning. Regrettably, the "alert" was usually sounded as the first stages of famine became all too apparent. Governments, journalists and donor agencies operating randomly would come to the the conclusion, at different times, that relief assistance was needed if the spread of starvation was to be curtailed. While "least costly" in terms of surveillance and monitoring costs, the informal, random system proved "very costly" in terms of effectiveness and objective achievement.

AID planners require notice of food need by quantity and location at least six months in advance of intended food arrival at the site where it is required. This takes into account the time needed by the donor community to analyze data on food shortage situations, the aid approval and dispatch process, ordering, shipping, warehousing and distributing the assistance in an orderly manner. The present FEWS project is designed to initiate and complete the full set of measures entailed in famine prevention.

Obviously the costs involved in helping to establish a coordinated systems approach to famine prevention are going to exceed those of the traditional ad hoc approach which prevailed in the first half of the 1980's. Justifying the costs for the systems' approach, however, can be complicated by several factors:

- The informal conventional approach to early warning has improved somewhat in recent years as normal surveillance, transport and communication systems have been improved.

- If famine does not occur, it may not be possible to attribute the non-occurence to famine early warning efforts. (Other factors such as adequate rainfall may have naturally precluded famine through the normal course of events.)

- There are numerous variations of project designs of different costs and dimensions, each of which could conceivably achieve the goal of diminishing famine in Africa.

Ultimately, the selection of the most effective alternative must rest with those most familiar with the objectives desired, the interposing constraints and the amount of funding available. Those most familiar with this set of factors--as related to famine early warning--have concluded that the project configuration recommended in this paper will be most effective.

2. Identifiable secondary benefits

If the recommended design is adopted, the project will lead to more systematic and comprehensive surveillance of host-country food security situations, efficient and scheduled reporting, and incorporation of food security monitoring and analysis into the development program of each AID mission. The project will also promote research in important, evolving aspects of famine early warning, remote sensing, social indicators, pedology and meteorology.

Aside from precluding loss of life and reducing human suffering, an effective early warning system can have an important effect on real resources and the development program. Famine and emergency measures to alleviate disasters will inevitably be more economically costly than measures which anticipate and prevent famine disaster. For example, it is more expensive to use "emergency channels" than the conventional means of transporting, managing and distributing food. In addition, emergency campaigns have the effect of delaying, suspending, or even reversing development programs.

3. Conclusion

Adequate early warning to prevent widespread starvation is fundamentally important and beneficial. The present FEWS project is seen as a necessary interim step to improve early warning capabilities in AID and FEWS countries. If famine is avoided during the course of the project it will be difficult to attribute this avoidance to the FEWS activities. However, the purpose of the FEWS project is attainable. That is, famine warning capabilities can be significantly upgraded

through the FEWS project. Project implementation will help assure institutionalization of food security monitoring and comprehensive surveillance within AID, the FEWS countries and the international community. In addition, the project will help strengthen and hasten the institutionalization of reliable African statistical and analytical services.

H. Social soundness analysis

1. Socio-cultural context and feasibility

Donors and governments have experimented with slightly more sophisticated famine early warning systems in response to each of the last two crises. In the mid-1970s, the emphasis was placed on rudimentary national food balance sheets. When in the early 1980s these proved insufficient for famine early warning, a combination of remote sensing of agroclimatological conditions along with field surveys of socio-economic and nutritional conditions was implemented in order to provide sufficient early warning about probable famine conditions. Both the remote sensing and the field techniques continue to evolve, so that in time it should be possible to reach agreement on the optimum early warning system. This project supports the development of this consensus, at the same time that it provides Washington decision-makers the information they need in order to avert famine.

A wholly independent FEWS system, is neither desirable nor possible. FEWS must depend on national and regional agencies for much of its data for two practical reasons. First, primary data collection is far too costly to be undertaken independently across the continent; secondary data must therefore be employed, and these are available mostly from national and regional agencies. Second, the unreliability of many data often leads to prolonged discussions about analysis and interpretation that can only be short-circuited through the use of generally accepted statistics from government agencies. FEWS will have to work closely with national and regional institutions in helping to build a sturdy local EW system.

2. Beneficiaries and participation

Famine is largely a problem of the poor. Moreover, famine strikes the poorest--the most vulnerable--people first. The at-risk populations are typically defined by class, race, gender, and age. An early warning system can facilitate provision of relief to these people who are most disadvantaged--ethnic minorities, women, the old and the very young. Thus, the intended beneficiaries of this project are the large numbers of subsistence producers who live in vulnerable areas of famine-prone countries.

A major consideration in food distribution programs is the follow-up to ensure that the needy populations receive sufficient food supplies. Although strictly speaking, this problem pertains to food distribution programs and not to famine early warning systems, FEWS can provide an independent verification where the program includes a nutritional monitoring component, if at-risk populations are surveyed repeatedly for nutritional status.

Beneficiary participation under the FEWS is strictly limited because FEWS is a data analysis project for famine early warning. Nonetheless, it is hoped that under the project some alternative reporting techniques will be attempted by local monitors. The results from this experimentation could then be compared to those from the more usual administrative reporting systems, in order to assess the costs and reliability of each.

Another group of beneficiaries comprises the various government agency personnel concerned with famine early warning in each country. These staff will receive training in various areas over the course of the project so that in time they can completely manage EWS tasks. These staff will also participate in the conferences sponsored under this project to define and resolve outstanding early warning technical issues. The training of and assistance to these staff should enable them to improve the performance of their home EWS agencies.

3. Impacts and other issues

The major impact of FEWS will be to he[illegible]rt the recurrence of famine. Admittedly, the project is [illegible]ted to assessing conditions that indicate serious local [illegible]d insecurities in order to mobilize food stocks to avert famine. The project per se does not deal with the root causes of famine--environmental degradation, overpopulation, marginal agricultural production, improper macro-economic policy and the like. Nor will the project deal with the policy implications of food distribution programs. But by helping to avert famine, the project can reduce the rate of impoverishment and limit the disruption of dislocation of the vulnerable populations, compared to what would happen if famine did break out. And, for donors and governments alike, the FEWS will enable sufficiently timely planning for food emergencies that the overall development program designed to address the root causes of poverty will not be temporarily derailed, as has happened in the past.

Finally, the sustainability of the FEWS approach depends upon the commitment of host country governments to install and maintain famine early warning units. The experience

of the last two decades has convinced all governments of the necessity of some famine warning system, even though the degree of sophistication of the systems varies greatly. FEWS aims to foster greater institutionalization of early warning concepts and methodologies in government(s) through technical assistance and training.

VI. PROJECT IMPLEMENTATION

A. Transition Period

During the period between project authorization and award of the implementation contract, it will be necessary to preserve valuable elements (experience, data, equipment) accumulated under the FEWS 1985-88 activity. Several steps should be taken within the following time frame:

1. The Database, including, map and tabular data, should be documented. The following activities are required:

   -- June 1: USGS delivers documentation guidelines to AID;

   -- July 1: Tulane University (TU) and Price Williams Associates (PWA) provide a listing of the data to be archived to AID outlining their priorities;

   -- Monthly: Partial data deliveries under the guidelines until completed;

   -- To be determined: FEWS workshop to determine status and problems in archiving and document lessons learned;

   -- November 1: Data base archive completed; and

   -- USGS to hold the archive and prepare for implementation of successor systems.

2. Software developed under FEWS should be prepared for transfer and use in the next activity phase:

   -- August 1: TU and PWA will provide a listing of all software developed for AID;

   -- September 1: AID will decide which software should be documented and delivered;

   -- October 30: Software, source code, documentation, and user manual delivered to USGS; and

   -- November 1: Training on software use and code, if required, provided by PWA and TU to USGS.

3. U.S. Government furnished equipment and software used by FEWS made usable for the next phase:

   -- May 1: A listing of all equipment, software licenses, and maintenance contracts provided to AID by TU and PWA;

   -- October 3: TU and PWA fill out forms for transferring licenses, registration, and maintenance agreements and provide to USAID. Repairs will be completed on the equipment and all property ready to be transferred;

   -- October 3: AID provide guidance on policies involved in distributing current equipment; and

   -- October 14: USGS will recommend to AID where current equipment should be placed in the context of the three tiered system for the next phase.

4. The lessons learned under the FEWS activity should be documented along with interpretation models and theoretical frameworks:

   -- August 15: "Lessons learned" papers will be submitted to AID in draft form by TU and PWA;

   -- September 14: AID will return papers with comments and suggestions after review by AID staff; and

   -- October 14: Final "lessons learned" papers will be delivered to AID.

5. Current FEWS FFRs in the field should be extended until June 1989 so that they can impart their knowledge, skills, and experience to replacements while preparing the vulnerability assessment due in May 1989.

   -- August 15: AID to have decided source of financing for extended FFR tours.

B. New project implementation

Project implementation will proceed on three fronts: gearing up within AID and executing operational agreements and contracts; lending assistance to host government early warning units; and, helping to develop among donors a common methodology for famine early warning.

1. Internalization Within AID

Upon AID authorization of the FEWS project, o/a July 22, 1988, the FEWS project manager will take action to have the project RFP published for full and open competition for the primary implementation agreement. Gray amendment entities will be encouraged to participate as prime or subcontractors. Also, an AID operational agreement will be entered into with the USG agency designated as the "GIS monitor" for FEWS (August 15). A working arrangement will be spelled out between USDA and AID outlining the modalities of interaction between the FEWS contractor-designate and USDA/JAWF/ERS (NLT August 24). Next, a working arrangement will be entered into with FAO under which transmission of ARTEMIS[17] information will be tested. If the test is successful, an agreement should be executed with FAO to supply GIEWS and ARTEMIS data on a fixed schedule during the LOP, or an appropriate. Finally, AID will award a contract to a firm with a Washington office to assist AID in implementing FEWS (NLT November 1). Allowing for slippage, all contract operational and working agreements should be concluded NLT November 6.

The contractor will be allowed two weeks to provide administrative training to contractor FFRs and home office staff. A contractor first-year "operations plan" will be prepared during the first two weeks with submission for AID review and approval. This plan, drafted in collaboration with the "GIS agency" and JAWF, should outline, inter alia, requirements and anticipated timing for field visits, FFR training and workshop schedules, proposed timing of GIS installations, home office and FFR work plans, plans for communication and networking to the field, and production plans for the trimesteral reports. The contractor will prepare equipment specifications for any new equipment authorized and start the procurement within the first two weeks.

A two-week workshop at the contractor facility in Washington will be conducted to orient core participants in the new FEWS activity. The USG agency will have lead development and financial responsibility for arranging the workshop and the contractor will provide facilities, and its own travel and logistics support. The two weeks will be used to explain the project strategy by reviewing AID project documents and the "lessons learned" papers from the previous FEWS activity. Field FFRs from the first FEWS project will be invited to make presentations on their experiences in promoting FEWS concepts in Africa. Key staff from the former FEWS contractor organizations (Tulane and Price Williams Associates) and other Government (JAWF, USGS, NASA, USDA, and others) and non-government experts will be available to elaborate on the lessons-learned papers and techniques of FEWS analysis. A senior FAO staff expert will be invited to conduct a briefing on GIEWS and ARTEMIS.

Immediately following, a second workshop will be held for four weeks at the USGS/EROS Data Center in Sioux Falls, South Dakota. The training workshop will emphasize hands-on system computer system skills used in data management, analysis, and information presentation. The exercises will concentrate on the practical analysis to be conducted in the field but also advanced analysis techniques which will be at the contractor home office and USG facility to support the field FFR.

The incumbent FFRs and Washington staff will return to the Washington office and prepare draft country plans over the following two weeks. The draft plans will be taken to the field with the FFR immediately following the two-week period. The plans will be finalized in the field over the following two weeks, in concert with the previous FFR (if still in the field) and the Mission. During the period January-April, the previous FFRs will, hopefully, remain in place to assist in the transition. Their replacements should arrive in the field no later than February 1989 so as to benefit from the experience and contacts of the former FFRs.

The training schedule will ensure that each FFR has full background on "basic GIS" before leaving for his/her duty station.[18] This GIS orientation will be followed up by on the job training in the field conducted periodically by the GIS agency. The contractor will also ensure that FFRs are familiar with the requirements for data collection, analysis ("convergence of indicators approach") and general early warning methodologies as outlined in the project paper. The section on "Working with Host Government Early Warning Units", which outlines the role of the FFR in reinforcing in-country capabilities and locating and exploiting data, should be underscored. The contractor will explain the following to FFRs prior to their departure from the U.S.: monthly reporting requirements under the "Food Security Operations cable system"; the FFR role as the early warning specialist on the USAID Team; and the working modalities that will exist between the contractor and FFRs--including the purpose and frequency of contractor visits to field posts, workshops, etc.

During the course of the project, the contractor's energies will be focused primarily on the following: working with the USG-GIS agency to improve the EWS database; maintaining a current GIS for all of the FEWS countries; working with the FFR's and missions, on techniques and methodologies for collecting and assessing socio-economic data for early warning purposes; assisting FFR's and Missions in producing trimesteral reports and monthly cables serving as conduit to FFR for early warning related material--satellite weather images, vegetation indices and agrometeorological data; and, providing technical assistance to host government EW Units and AID staff.

One year after the award of the FEWS contract, the contractor will prepare for AID an end-of-year report which spells out: problems faced and techniques used by FEWS staff to resolve them during the past year; lessons learned within individual FEWS countries, together with recommendations for any needed adjustments in the AID FEWS project; and, a strategy, to be reviewed by AID, covering the second year of contract operations. The same report-review process will be followed at the close of the second year of contract operations. A complete end-of-contract report will be prepared by the contractor in accord with AID regulations.

Meanwhile several steps will have been taken within the AID organization prior to the approval of the FEWS project on or about July 22. AA/AFR will have decided on the need for, objectives, composition and functions of "the Bureau Food Sector Committee" referred to in section III A of this paper. A memo will then be drafted, for circulation within the agency, which reflects this decision and provides the background for creation of the Committee, its role and membership. A cable, addressed to USAID Directors in FEWS countries, will also be drafted covering the same topic. The cable will contain a strong endorsement of the new FEWS strategy by AA/AFR and underscore the need for timely monthly reporting under the new Food Security Operation's reporting system. The memo will be circulated and the cable dispatched upon authorization of the FEWS project.

During the first meeting of the newly established Africa Bureau Food Sector Committee (on or about August 15) procedural guidelines will be agreed on in accordance with the recommendations in Section III A. Particular care will be taker by the Committee to frame recommendations for AA/AFR's attention and decision in clear, convincing and actionable prose. Provisions should be made to file and store Committee deliberations and recommendations so that they can be reviewed for insights in problem situations of a recurring nature. Carefully prepared "issues papers" and copies of outgoing actior cables should suffice for this memory-storage purpose.

At the USAID Mission level there will be a similar structuring of a Food Security Operations Group after the authorization of the FEWS project. Clear guidance will have to be issued on the functions of the group including those for the Missions's early warning officer (i.e., the FEWS FFR). Particular attention should be paid, in the Mission guidance memo, to the process to be followed within USAID in compiling the Food Security Operations (FSO) cable due in Washington on the first working day of each month. The analysis in this cable will serve as the principal basis for AA/AFR decision-making on early warning issues. Consequently, the cable must be comprehensive, contain clear recommendations and indicate information sources as appropriate.

2. Working with host government and donors in FEWS countries

Upon authorization of the Project Paper, USAID Directors will assess the current effectiveness of the government-donor high-level committees. Wherever necessary, an attempt will be made to revitalize these committees along the lines discussed in section III B. of this paper. Where there is a need for some technical input on early warning strategy, the USAID Director should request assistance through the FEWS contractor in Washington if the FFR does not feel proficient in the particular technical area. If donor participation or attendance at committee sessions is not adequate, the USAID Director should enlist the assistance of AID/W in urging more participation during AID's discussions with other donor headquarters.

At the technical level, new FFRs will assume their role responsibilities (as outlined in section III A) after a suitable period of orientation by his/her predecessor FFRs. The country workplan should be updated as appropriate, prior to the departure of the seasoned FFR.

After becoming comfortable with his/her colleagues at the government's early warning unit, the FFR should suggest that an early warning workshop be held in-country with representatives invited from government line agencies and donor/PVO missions. The workshop will be used to forge more effective early warning links throughout the government bureaucracy and private organizations. The FFR should draw on USAID offices and U.S.-based support services for assistance in designing the AID participation in the workshop. This would be a good occasion to demonstrate the versatility of the GIS information system for early warning purposes. The workshop is also an opportunity to focus on the kinds of instructional training materials needed to spread the word on early warning concepts and methodologies. Examples of materials from other countries should be introduced by way of urging that responsibilities be assigned for drafting similar materials suitable to the local environment.

The FFR will want to assess the effectiveness of his/her efforts against the targets previously established--approximately one year after arrival in-country. This assessment will prove very useful in devising a second-year strategy in collaboration with an FFR counterpart who should be recruited to succeed the FFR upon his/her departure at the end of the 36 month assignment. The new strategy should also be discussed with key members of the USAID Mission, the early warning unit and the donor community--since their involvement will undoubtedly be necessary for a successful implementation of the strategy.

At the end of his tour, the FFR will be responsible for a "Tour Completion Report" which will include the following: assessment of early warning capability of the host government; FFR accomplishments during the tour; status of early warning capability in the USAID Mission and donor community; and recommendations for improving early warning effectiveness in-country, the USAID Mission and the donor community.

3. Working at the international level

Successful collaboration on the international level comes down to good timing, workable agendas, and doing "one's homework".

The timing seems right to start a consultation process on early warning. Representatives of key international agencies--FAO, WFP, WMO, UNDP and the IBRD--have recently expressed the need for more regular coordination on early warning issues. Donor agencies contacted--the French, the Dutch and the European Community--suggested the same. There should be no difficulty in finding a host city for the first meeting. Upon approval of the project paper, AID should make known its willingness to participate in a small working group to the Dutch who have shown a keen interest in famine early warning.

The process of moving forward in a collaborative mode is outlined in Chapter III C along with an illustrative agenda which can be drawn on during early working group sessions. There are three critical elements in the process: instructions for AID representatives should be concise, clear and approved in writing by the Deputy AA/AFR prior to travel to the workshop site;[17] AID representatives should work to obtain tangible outputs in the form of agreement on: problem(s) definition, the nature of the obstacles to be overcome, alternative ways for meeting objectives, essential elements of early warning strategies, cost sharing approaches, ideas to be suggested to donor field offices, etc ; and a full debriefing should be prepared in writing to the Deputy AA/AFR upon return to Washington. This will enable him to give "guidance" on follow-up within AID and for future group sessions.

4. Procurement

The project will acquire apparatus from the predecessor FEWS activity. A detailed listing of available (and required new) equipment and software is provided in appendix F.

The project will use the following major items:

a. <u>For U.S-based contra..tor facilities</u>

-- Portable lap-top microcomputers
-- Publishing microcomputer with 386 processor (except with Laser printer and enhanced word processor capability) (Pizzaz, Mirror, Pro Design)
-- Office Level B GIS with 386 processor 2 mb memory; 300 mb hard disk; 387 coprocessor; Pen plotter output; ARC/INFO GIS for micro-level capability to do GIS on relatively small data bases.

-- Technical services and Information (FFRs)

b. <u>For field analysts (6)</u>

-- Portable lap-top microcomputer Spread sheet; data base management; word processing; Tabular data entry; communications

-- Microcomputer with 286 processor for Mission/ mb memory; 80 mb hard disk; (Atlas, SPSS, Ida)

c. <u>For host-country EWS facilities (6)</u>
Note: the timing of procurement on as-needed basis when requested by Mission and AID/W)

-- 1 mb memory; 80 mb hard disk; ATLAS (***) graphics; Color Image display with ATLAS SPSS stat analysis; dot matrix printer

IMPLEMENTATION SCHEDULE

	Year 1 Quarter				Year 2 Quarter				Year 3 Quarter			
	1	2	3	4	1	2	3	4	1	2	3	4
Procurement												
U.S.-Contractor Equipment	—											
Field GIS Equipment												
Sudan	—											
Niger	—											
Chad	—											
Mali	—											
Burkina	—											
Mauritania	—											
Host country EWS			as			needed				basis		
Training												
Field Representatives Basic EWS Training	—				—				—			
GIS Training												
in Sioux Falls			—									
Sudan					—				—			
Niger					—				—			
Chad						—				—		
Mali						—				—		
Burkina							—				—	
Mauritania							—				—	
FFR Counterparts	—	—	—	—	—	—	—	—	—	—	—	—
Host Govt Counterparts (Optional buy-ins)	—	—	—	—	—	—	—	—	—	—	—	—

IMPLEMENTATION SCHEDULE (continued)

	Year 1 Quarter				Year 2 Quarter				Year 3 Quarter			
	1	2	3	4	1	2	3	4	1	2	3	4
Financial Planning Procurement												
-US Contractor Equipment	—											
-FFR Equipment (plus augmentation)	—				—	—	—	—	—	—	—	—
-Host Country Field Equipment	on				as		needed			basis		
-Tech. Services & Information	—	—	—	—	—	—	—	—	—	—	—	—

VII. PROJECT MONITORING-EVALUATION PROVISIONS

A. Monitoring

Given the range of technical elements encompassed within the project, the FEWS project committee will be expanded to include representatives from USDA (JAWF), and USGS--in addition to AID core members and "on-call" contractor representatives. For the same reason, the project committee will have to meet at least quarterly during the first year of project activity. The Committee will carefully assess the rate of implementation under each of the project's components: early warning sensitization within AID; growth of early warning capability within EWUs, and evolution of a common EW methodology with the international community.

Concerning early warning capability within AID, the project committee will be particularly concerned about the rate-of-progress on: structuring the Food Security Committees with their monthly reporting/information systems; establishing the support-service system between U.S.-based offices and the FFR/USAID Missions; the FFRs success in structuring the USAID's data-collection-processing and analysis system; the progress in installing GIS capability in the Missions; and, the timeliness and adequacy of early warning insights (in USAID monthly reporting cables) and in AID/W responses.

The project committee will have to be particularly alert and active during the transition period between present and future FEWS contractors--i.e., November 1988-January 1989. This is the second most important time in the year for decisionmaking on early warning issues (the first being September-October). Harvest figures will become available at that time and the Agency will have to decide on the magnitude of food assistance it will contribute to FEWS countries for the remaining portion of 1989. The current FEWS contractors will be divesting themselves of operational responsibilities during this transition period and the insights/timing of the new contractor will not yet have been sharpened. Precious prevention time will be lost if the project committee is not vigilant.

Although the AID/W-based project committee will try to assess how effectively the FEWS project is contributing to the improvement of individual host country early warning capabilities, the committee's distance from the action scene means this responsibility will fall almost entirely to the field

Missions. However, the Committee will be able to gain insights on progress or the lack of progress in this area from reporting cables, visits to the field and discussions with field staff (AID and non-AID) while they are visiting Washington.

In the area of helping to improve early warning methodology within the international community, the project committee can play a significant backstopping role. Efforts to collaborate on the international circuit can prove frustrating, even disappointing, unless an effort is made, beforehand, to devise objectives that are clear, relatively simple and achievable. The Committee should be actively involved in the drafting of AID agendas for the meetings, in adjusting AID strategy, as necessary, during the on-going process and making sure there are tangible outputs from the international collaboration.

Most importantly, the project committee should be conscious, from the beginning, of the need to evaluate the effectiveness of AID's early warning system, as called for below. The evaluation effort will, of course, focus on "log frame" material--i.e., purpose, outputs, verifying indicators of progress, etc. But the basic question will be--has the capability for issuing warnings been improved so that timely famine prevention measures can be taken?

As the FEWS system unfolds, the warning-decision process may not always be clearly manifested. In some situations, there could be a clear one-time sounding of the famine alarm, with ensuing swift donor decisions and rapid arrival of stop-gap provisions. A more likely scenario, however, is one in which the "alarm" is more muted and sounded over a period of weeks as analysts search for a convergence of indicators. Similarly, response decisions are likely to be made sequentially, as more information becomes available, and food assistance will be authorized usually in an incremental fashion. Under such a scenario, a "scanning device" is needed to detect warnings, even when they are not clearly labeled, so that the decision-making process will be activated. The Project Committee is that scanning device.

The Project manager will brief the Bureau's Food Sector Review Committee after each quarterly review of FEWS rate of implementation.

B. Evaluation

The project will be formally evaluated during the third year but prior to the third agricultural season. This timing

will facilitate planning for the final year of project activities and devolution. The evaluation report will provide insights on "early warning readiness" within the AID organization and outline any remaining steps needed to effectively internalize early warning in AID prior to the termination of the FEWS Regional activity.

VIII. FOOTNOTES

[1] For example, the AID Africa Bureau created a senior position in the Office of the Assistant Administrator to coordinate "Refugee and Humanitarian Assistance".

[2] This does not hold true in the case of "disasters" or "emergencies" which occur in the LDC world. These episodic events very much occupy AID attentions and energies--in some countries causing the development program to be "put on hold" for weeks.

[3] See Alamgir, M., Famine in South Asia- Political Economy of Mass Starvation, (Velgeschlager, Gunn, and Hain Publishers, Cambridge) p. 7

[4] i.e., Using regular planning and implementation systems. In some instances this will call for three months' lead time; for example, when food must be purchased and moved from one part of a drought-prone entity to another part of that country. In other instances, the lead time required could be as much as six months: for example, when food must be obtained abroad and delivered to remote areas of land-locked countries.

[5] James Harkin describing "the Standard Scenario for African Famine" in the New York Times (March 8, 1981) wrote in part: "Finally, after some months ... the success of the relief program will be shouted by stressing how many people have been saved from death. It is a false conclusion ... food emergency programs, monumental exercises that they are, provide food in piddling amounts compared to the proclaimed need. Large scale famine may be avoided, not because of the organized relief effort but simply because Africa's impoverished millions are, as yet, unready to submit to starvation."

[6] See the IBRD's "Report of the Task Force on Food Security in Africa" (draft) p. 1.

[7] The Task Force elaborated: "Most African economies are hampered by rapid population growth, face adverse terms of trade and an unfavorable economic environment, and are undertaking a series of politically difficult adjustment measures to reestablish the preconditions for economic growth, with limited administrative capabilities to handle even on-going programs" (p. 1, ibid)

8 The Joint Agricultural Weather Facility (JAWF) monitors regional weather, identifies anomalous weather patterns and quantifies agricultural weather assessments. JAWF uses surface observations from WMO/GTS, and the GOES,GMS and METEOSAT satellite cloud cover data. Additionally JAWF produces information regarding crop condition, evapo-transpiration and is researching means to estimate available water balance. The data and analyses are available in weekly, monthly and irregular (special) reports in written and in map form. The staff of FEWS will have regular access to JAWF data, appropriate technical briefings and, by arrangement, to selected raw data and research progress.

9 See Pons, Roger, "Predicting Food Crisis Situations in the Sahel", O.E.C.D. Club du Sahel, p.3.

10 "Appraisal of The Early Warning System in the Sahel". (OECD, 1987) p. 69.

11 Pons, "Predicting Food Crisis".

12 Ibid., (no page number).

13 Hervio, Ibid., p. 49.*

14 In 1986 over $1 million was spent on the AEDES exercise in Chad.

15 Hervio p. 9.

16 Field Representatives will be recruited who are comfortable with general computer operations (i.e. micro-computer literacy)--and able to demonstrate basic skills in this area before being hired. As a rule the candidate FFRs will have basic academic training and qualifications as a geographer, rural sociologist, economic anthropologist, ag economist, regional planner, or related development experience. He or she should also have appropriate language, statistical and investigative skills, have overseas experience, be willing to travel to remote areas and be a self starter.

17 Much of the work load for the international collaboration will fall on AID officers with FEWS management/technical responsibilities. However, the FEWS contract staff will be called on for assistance in the international collaboration process as is necessary and appropriate.

ANNEXES

ANNEX A

PID Approval Message

UNCLASSIFIED

Department of State

OUTGOING TELEGRAM

PAGE 01 OF 02 STATE 056433 4884 089777 AID4414
ORIGIN AID-00

ORIGIN OFFICE AFPD-04
INFO AAAF-03 AFEA-03 AFSA-03 AFRA-03 AFFW-04 AFCW-03 AFDP-06
FPA-02 AFEC-02 AFEO-02 AFTR-05 FVA-01 OFDA-02 PDPR-01
PPPB-02 GC-01 GCAF-01 STFN-02 SAST-01 FFP-09 FVPP-01
AGRI-01 COM-02 OMB-02 RELO-01 /067 A4 KL24

INFO LOG-00 EUR-00 AF-00 EB-00 IO-19 TRSE-00 FDRE-01
/020 R

DRAFTED BY: AID/AFR/PD/SWAP:MMMCKAY::4555M
APPROVED BY: AID/DAA/AFR:WBOLLINGER
AID/AFR/PD:BBURNETT AID/AFR/PO:CPEASLEY
AID/AFR/TR:BKLINE (DRAFT) AID/AFR/SWA:JLEWIS (DRAFT)
AID/AFR/EA:RENEY (DRAFT) AID/AFR/OP:PRADER (DRAFT)
AID/GC/AFR:AADAMS (DRAFT) AID/OFDA:PKRUMPE (DRAFT)
AID/AFR/ECO:HFARNHAM (DRAFT)
AID/ST/FNR:CPAUL (DRAFT)
AID/PPC/PDPR:JATHERTON (DRAFT)
AID/PPC/PB:RMAUSHAMMER (DRAFT)
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R 240758Z FEB 88
FM SECSTATE WASHDC
TO AMEMBASSY ABIDJAN
AMEMBASSY ADDIS ABABA
AMEMBASSY BAMAKO
AMEMBASSY BANJUL
AMEMBASSY DAKAR
AMEMBASSY DJIBOUTI
AMEMBASSY GABORONE
AMEMBASSY HARARE
AMEMBASSY KHARTOUM
AMEMBASSY LUSAKA
AMEMBASSY MAPUTO
AMEMBASSY NDJAMENA
AMEMBASSY NIAMEY
AMEMBASSY NOUAKCHOTT
AMEMBASSY OUAGADOUGOU
AMEMBASSY PARIS
AMEMBASSY PRAIA
AMEMBASSY ROME

UNCLAS STATE 056433

AIDAC ABIDJAN FOR REDSO/WCA, NAIROBI FOR REDSO/ECA,

E.O. 12356: N/A

SUBJECT: FAMINE EARLY WARNING SYSTEM (698-0466) PID

PARIS FOR DECD; ROME FOR FODAG

REF: STATE 332601

1. ON JANUARY 12, 1988, THE EXECUTIVE COMMITTEE FOR PROJECT REVIEW (ECPR) APPROVED THE SUBJECT PID AT A LEVEL OF DOLS 6 MILLION FOR THREE YEARS. MISSION COMMENTS ILLUSTRATE THE COMPLEXITY OF EARLY WARNING IN AFRICA. THE DECISION TO LIMIT THIS TO A THREE YEAR PROJECT REFLECTS THE RAPIDLY CHANGING NATURE OF MANY EARLY WARNING EFFORTS IN AFRICA AND ADHERES TO THE AFRICA BUREAU STRATEGY OF LIMITING REGIONAL PROJECTS. THE PROJECT COMMITTEE IS GRATEFUL FOR THE SUBSTANTIVE EFFORT CONTRIBUTED BY FIELD MISSIONS IN DESCRIBING MISSIONS' EXPERIENCE AND CONCERNS WITH EARLY WARNING.

2. DURING THE ECPR, IT WAS ACKNOWLEDGED THERE IS NO CONSENSUS ON WHO THE PRIMARY USERS OF FEWS ARE OR SHOULD BE, WHO BENEFITS FROM THIS EARLY WARNING DATA, WHAT DATA

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ARE REQUIRED, HOW BEST USED, ETC. THE DAA/AFR DIRECTED THE COMPLETION OF A NEEDS, OR REQUIREMENTS, ANALYSIS AS QUICKLY AS POSSIBLE TO ANSWER THESE QUESTIONS. THIS ANALYSIS IS A PRECURSOR TO THE PROJECT PAPER, AS ITS FINDINGS WILL IMPACT ON OTHER ISSUES RAISED DURING THE PID REVIEW SUCH AS THE NATURE AND QUALITY OF THE DATA AND TARGETED DECISION-MAKERS.

3. THIS PROPOSED PROJECT IS TO PROVIDE EARLY WARNING INFORMATION SO THAT INTERNATIONAL DONOR ASSISTANCE, PARTICULARLY U.S., CAN BE TIMELY AND APPROPRIATE. CORE FUNDING IS TO INCLUDE ASSISTANCE FOR IMPROVING THE NETWORK BETWEEN FEWS AND CERTAIN OTHER EARLY WARNING EFFORTS WHERE SUCH COLLABORATION IS MUTUALLY BENEFICIAL. WHILE LIMITED ASSISTANCE FOR INSTITUTIONALIZING NATIONAL EARLY WARNING ACTIVITIES MAY BE SUPPORTED FROM THE CORE BUDGET OF DOLS 6 MILLION, ALL BILATERAL COLLABORATION WILL BE FUNDED THROUGH THE MISSION BUY-IN MECHANISM. THUS, THE CORE BUDGET IS SUPPLEMENTED WHEN MISSIONS QUOTE BUY IN UNQUOTE FROM THEIR BILATERAL OYBS SO THAT THE AUTHORIZED BUDGET LEVEL WILL EXCEED DOLS 6 MILLION.

4. MORE SPECIFIC ECPR DISCUSSION OF THE ISSUES AND GUIDANCE FOR THE PREPARATION OF THE PROJECT PAPER ARE OUTLINED BELOW.

A. TARGETTED COUNTRIES

THE ECPR CONCLUDED THAT THE FOLLOWING EIGHT COUNTRIES SHOULD BE CONSIDERED FOR PARTICIPATION IN THE PROJECT: BURKINA, CHAD, ETHIOPIA, MALI, MAURITANIA, NIGER, SOMALIA AND SUDAN. DURING THE ECPR, IT WAS AGREED THERE ARE MANY CONSIDERATIONS FOR PARTICIPATION OF A COUNTRY IN THE PROJECT SUCH AS SUSCEPTIBILITY TO DROUGHT AND FAMINE, EXISTING EARLY WARNING CAPACITY, MANAGEMENT CONCERNS, POLITICAL CONCERNS AND STATUTORY OR OTHER LEGISLATIVE PROHIBITIONS IN EFFECT AT THE TIME OF PP APPROVAL. THE PP TEAM IS TO MORE CLOSELY EXAMINE THIS TOPIC IN LIGHT OF THESE CONSIDERATIONS AND RECOMMEND IF THESE OR ADDITIONAL COUNTRIES SHOULD PARTICIPATE, (E.G. SENEGAL.) EVERY EFFORT IS TO BE MADE TO ENSURE THAT ALL DROUGHT-PRONE COUNTRIES IN THE SAHELIAN BELT PARTICIPATE TO THE EXTENT OF MEETING DATA REPORTING REQUIREMENTS.

B. AFRICANIZATION

DURING THE PROJECT REVIEWS THERE WAS LENGTHY DISCUSSION CONCERNING THE APPROPRIATE ALLOCATION OF PROJECT RESOURCES TO DEVELOP AN AFRICAN EARLY WARNING CAPABILITY, (I.E. EITHER INDIVIDUAL COUNTRY OR SUB-REGIONAL). BECAUSE ALMOST ALL EARLY WARNING INFORMATION ORIGINATES IN THE HOST COUNTRIES, SOME HOST COUNTRY CAPABILITY IS FUNDAMENTAL FOR SUCCESSFUL EARLY WARNING. NONETHELESS, ONLY A MODEST AMOUNT OF THE FEWS REGIONAL FUNDING IS TO BE ALLOCATED FOR THE DEVELOPMENT OF HOST COUNTRY EARLY WARNING CAPABILITIES. IT IS NOTED THAT THE FEWS STAFF CURRENTLY ASSIGNED TO INDIVIDUAL COUNTRIES HAS AIDED IN THE DEVELOPMENT OF INDIGENOUS CAPABILITIES IN MANY CASES. IT IS ANTICIPATED THAT THE PROPOSED PROJECT WILL REINFORCE THIS INFORMAL TRANSFER OF TECHNOLOGY. THUS, SOME OF THE TECHNICAL ASSISTANCE PROVIDED IN THE PROJECT WILL HELP DEVELOP AN INDIVIDUAL COUNTRY CAPABILITY ON A TARGET-OF-OPPORTUNITY BASIS WHETHER SPECIFICALLY INTENDED FOR THIS PURPOSE OR NOT. DURING THE ECPR IT WAS GENERALLY AGREED THAT DEVELOPMENT OF INDIVIDUAL COUNTRY CAPABILITIES CAN BE BETTER MANAGED ON A BILATERAL BASIS. THE PP TEAM IS TO EXAMINE THE OPTION OF PERMITTING MISSION BUY-INS TO FEWS FOR

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SPECIFIC ACTIVITIES TO DEVELOP HOST COUNTRY EARLY WARNING CAPABILITIES. HOWEVER, WHERE NEIGHBORING COUNTRIES HAVE ASSOCIATED ON A SUB-REGIONAL BASIS, SO AS TO ENJOY SOME PLANNING AND INFORMATION NETWORKING ECONOMIES OF SCALE (SUCH AS CILSS IN THE SAHEL), FEWS CORE FUNDING SHOULD BE USED TO UNDERWRITE LIMITED COLLABORATION WITH SUCH A REGIONAL INSTITUTION.

C. ROLE OF FEWS VIS-A-VIS OTHER EARLY WARNING EFFORTS

THE PID RECOGNIZES THE NEED FOR A NETWORK OF EARLY WARNING EFFORTS AND THAT FEWS EFFORT MUST BE COORDINATED WITH OTHER EARLY WARNING SYSTEMS. BECAUSE OF PROJECT COMMITTEE AND MISSION CONCERNS, THE PP TEAM WILL PREPARE A PLAN WHICH FULLY DETAILS HOW FEWS IS TO BE COORDINATED AND INTEGRATED WITH OTHER SYSTEMS. THIS MUST BE CLEARLY DEFINED BOTH BECAUSE IT IMPACTS ON THE IMPLEMENTATION OF THE PROJECT AND BECAUSE OTHER EFFORTS COMPLEMENT FEWS. THE EARLY WARNING EFFORTS OF OTHER DONORS OR CONSORTIA, PARTICULARLY CILSS/AGRHYMET, CILSS/DIAPER, CILSS/RERESAL OR FAO'S GLOBAL INFORMATION AND EARLY WARNING SYSTEM (GIEWS), COULD FACILITATE THE FUTURE PHASE-OUT OF FEWS ACTIVITIES. THE CONCEPT OF FEWS DISCUSSED IN THE PID PRESUMES THE EVENTUAL EMERGENCE OF AN INTERNATIONAL SYSTEM WHICH CAN PROVIDE TIMELY, CREDIBLE, OBJECTIVE EARLY WARNINGS. IF THIS IS THE CASE, THIS ORGANIZATION'S EFFORTS WOULD LEAD TO A RELIABLE SYSTEM FOR DATA COLLECTION AND ANALYSIS WHILE FEWS RESPONSIBILITIES WOULD SHRINK TO CROSS-CHECKING, CORROBORATING, AND DISSEMINATING INFORMATION THROUGHOUT A.I.D. OTHER DONORS SHARE THE PERCEIVED NEED FOR SUCH AN ORGANIZATION AND THEY SEE FAO AS A LIKELY CANDIDATE.

HOWEVER, FAO'S CURRENT DEFINITION OF EARLY WARNING (CROP FORECASTING) IS TOO LIMITED. FEWS STAFF HAS BEGUN DEVELOPING TECHNICAL LEVEL COORDINATION WITH GIEWS IN TERMS OF RESEARCH AND DEVELOPMENT AND INFORMATION SHARING.

SPECIFIC LINKS PROPOSED DURING THE PID REVIEW INCLUDE THE PLACEMENT OF FEWS STAFF IN OUAGADOUGOU NOT ONLY TO IMPLEMENT FEWS IN BURKINA, BUT ALSO TO COORDINATE WITH CILSS/DIAGNOSTIC PERMANENT, AND CILSS/FAO/RERESAL (PRE-CRESAL). A SECOND PROPOSED LINK DISCUSSED IS PLACEMENT OF A CONTRACTOR IN NIAMEY TO MEET COUNTRY NEEDS AND COORDINATE WITH CILSS/AGRHYMENT IN THE SAME FASHION. THE PP TEAM WILL BE REQUESTED TO EXAMINE THESE OPTIONS MORE CLOSELY AND RECOMMEND ADDITIONAL APPROPRIATE LINKS TO SUCH COLLATERAL EARLY WARNING EFFORTS.

D. FINANCIAL AND ECONOMIC ANALYSIS

AS NOTED IN THE PID AND EARLIER IN THIS GUIDANCE, THE FINAL DESIGN WILL DEPEND, IN PART, ON THE COSTS OF PROJECT IMPLEMENTATION. THE PID ASSERTS THAT THE COST OF FEWS WILL BE MUCH LESS THAN THE COST OF RESPONDING TO A FAMINE WITHOUT ADEQUATE INFORMATION. HOWEVER, THE ECONOMIC AND FINANCIAL ANALYSES ARE NOT YET COMPREHENSIVE. THUS, IT IS IMPOSSIBLE TO BE SURE WHICH IMPLEMENTATION ALTERNATIVE IS THE MOST COST-EFFECTIVE. THE PP TEAM SHOULD COMPLETE A THOROUGH ANALYSIS OF DESIGN ALTERNATIVES INCLUDING THOSE OUTLINED IN THE PID (EXCEPT ALTERNATIVE 1) AS WELL AS ALTERNATIVES THAT ARISE OUT OF AN ANALYSIS OF THE NEEDS ASSESSMENT. THIS ANALYSIS MUST BE RIGOROUS AND IS TO INCLUDE ALL OF THE IMPLICATIONS OF THE VARIOUS ALTERNATIVES INCLUDING RECURRENT COSTS. FURTHER, COST SAVINGS BY ADOPTING LESS PERSONNEL-INTENSIVE APPROACHES ARE ALSO TO BE EXAMINED. ONE SPECIFIC ALTERNATIVE RAISED DURING THE ECPR AND

REQUIRING FURTHER ANALYSIS, IS THE COST OF USING ONE UMBRELLA IMPLEMENTATION CONTRACT TEAM VERSUS THE RECRUITMENT OF PSCS FOR EACH OF THE THE CORE-FUNDED POSITIONS TO BE DESIGNATED IN THE PP.

E. QUALITY OF DATA

THE PID RECOGNIZES THAT MAINTAINING DATA QUALITY IS AN ONGOING EFFORT. AS COLLECTING HIGHLY RELIABLE PRIMARY DATA IS PROHIBITATIVELY EXPENSIVE, THE PID PROPOSES TO CONTINUE TO RELY MOSTLY ON SECONDARY DATA SOURCES. THE FINDINGS OF THE NEEDS ANALYSIS DESCRIBED IN PARAGRAPH 3

ABOVE AS WELL AS THE MID-1987 ASSESSMENT OF THE FEWS SHOULD PROVIDE VALUABLE INSIGHTS ON THIS ISSUE. THE ECPR AGREED THE QUALITY QUESTION WILL BE AN ONGOING CONCERN EVEN DURING PROJECT IMPLEMENTATION. ULTIMATE RESOLUTION OF THIS ISSUE DEPENDS ON EXPECTATIONS OF THOSE USING THE EARLY WARNING DATA SYSTEM AND HOW THE DATA ARE USED. THE PP TEAM IS TO EXAMINE THIS ISSUE MORE CLOSELY USING THE COMPLETED NEEDS ANALYSIS AND RECOMMEND A COURSE OF ACTION BASED IN PART ON THE ECONOMIC AND FINANCIAL ANALYSES OF THE PROJECT.

F. APPROPRIATENESS OF THE PROPOSED PROJECT

THE ECPR DISCUSSED AT LENGTH THE PROS AND CONS OF A SEPARATE REGIONAL EARLY WARNING PROJECT AS PROPOSED IN THE PID. THE MID-1987 ASSESSMENT OF THE FAMINE EARLY WARNING SYSTEM INDICATES THAT SOME USERS QUESTION THE UTILITY OF FEWS REPORTS AND DATA. SUBSEQUENT FIELD COMMENTS SOMETIMES QUESTIONED THE UTILITY OF FEWS DATA. OTHER ASSESSMENTS AND COMMENTS SUCH AS THE WORLD BANK STUDY OF EARLY WARNING SYSTEMS ARE MORE POSITIVE. THERE IS CLEAR AGREEMENT THAT THE FEWS OBJECTIVES ARE IN LINE WITH A.I.D. STRATEGY AND THAT FEWS DESIGN SHOULD PROCEED. AS NOTED ABOVE, A NEEDS ASSESSMENT IS TO BE COMPLETED AS QUICKLY AS POSSIBLE TO HELP ENSURE THAT FINAL PROJECT DESIGN APPROPRIATELY SERVES THE DATA REQUIREMENTS OF ALL OF THE TARGETTED DECISION MAKERS.

5. FEWS AND BILATERAL COUNTRY STRATEGIES

AS A RESULT OF EXTENSIVE DISCUSSION DURING THE ECPR ABOUT THE IMPACT OF FAMINES ON DEVELOPMENT ASSISTANCE EFFORTS, THE DAA/AFR DIRECTED THAT A.I.D. MISSIONS IN DROUGHT-PRONE COUNTRIES INCORPORATE EARLY WARNING AND DROUGHT RESPONSE AS PART OF THEIR OVERALL PROGRAM STRATEGY. THIS STRATEGY IS TO BE INCLUDED AS PART OF THE MISSION'S ACTION PLAN AND WILL INCLUDE A PLAN OF ACTION FOR COPING WITH SPECIAL NEEDS SUCH AS DROUGHTS OR LOCUST/GRASSHOPPER INFESTATIONS. THIS PLAN IS TO ADDRESS HOW THESE EFFORTS COMPLEMENT ONGOING DEVELOPMENT ACTIVITIES. AN EXAMPLE OF THIS INTEGRATION IS THE REMOTE SENSING PROJECT IN SUDAN WHICH GENERATES NOT ONLY AN ANNUAL AGRICULTURE ASSESSMENT BUT ALSO PROVIDES EARLY WARNING OF AGRICULTURAL PRODUCTION SHORTFALLS. SHULTZ

ANNEX B

Log Frame Matrix

ANNEX B

LOGICAL FRAMEWORK

PROJECT TITLE: FAMINE EARLY WARNING SYSTEM

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
GOAL			
To reduce the incidence of famine in Africa, thereby, helping to insure food security in famine prone countries	-Reduction, over time, in famine and famine-related effects in the countries monitored	-Assessment of famine disaster declarations	-Famine is a human caused disaster -Adequate famine early warning date will become available -Appropriate famine prevention response will be implemented
PURPOSE			
To help establish a famine early warning system that provides timely information so that decision makers can authorize famine prevention initiatives. enable preventative measures to avert famine	-Data and information are provided when and in the form required -Improved host country monitoring capabilities for famine forecasting and forward planning -Improved collaboration with international monitoring agencies -Integration of famine risk monitoring into development plans and programs -Improved satellite monitoring capabilities and analysis and interpretation of remotely-sensed data	-Evaluations of of the project -Review of AID's CDSS, AP and ABS directives -Evaluation, relative importance of remote data in EWS	-Necessary data can be made available and adequate analysis achieved in time to avert famine -For this project, the above applies to data sources and cooperation of host country and international organizations -AID and its field missions wish to integrate early warning into agency development programs -Adequate scientific support is provided

LOGICAL FRAMEWORK

PROJECT TITLE: FAMINE EARLY WARNING SYSTEM

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
OUTPUTS			
-Enhanced USAID information and development programs	-Timely and reliable mission-generated country situation reports -Increasingly improved host government data and information systems -Eventual reduction of USDH and contractor information collection and monitoring	-Evaluations -Backstop surveys -FEWS / Washington -Phased-out FEWS	-AID/W will require systematic attention to early warning monitoring as part of the development program -USAID's cooperation

PROJECT TITLE: FAMINE EARLY WARNING SYSTEM

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
OUTPUTS (cont.)			
-Enhanced host country information systems and monitoring capacity	-Quantity of technical assistance and training provided host systems and personnel -Proportion of host-source data and information employed in FEWS -Implementation of GIS	-Evaluation and FEWS monitoring -FEWS Representative	-The host country will cooperate actively with FEWS i.e. that FEWS will have the resources to attract cooperation -International donor and regional organization cooperation
-Improved capabilities of and cooperation among regional, international and PVO country-situation monitoring agencies including adoption of international guidelines	-Enhanced data and information exchange and systems coordination -Mechanisms for cooperation e.g. circulation of reports, technical exchanges, workshops	-Evaluations -System monitors -FEWS managers technology etc.	-FEWS will have the resources to promote cooperation including data, information, technology etc. to share -FEWS will be accepted by the international community

LOGICAL FRAMEWORK

PROJECT TITLE: FAMINE EARLY WARNING SYSTEM

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
INPUTS			
-Data and Information Systems o Methodology o Surface data and information from multiple sources o Remotely-sensed data o Geographic data system o Polygon overlay o Data analysis - U.S. and field o Reporting system	-Items are in place and/or operational -Appropriate actions undertaken -Meetings held -Equipment purchased	-Implementation monitoring -Evaluations -Accounts	-Funds available -Talent available -International cooperation -USAID cooperation -Host-country cooperation
-Technology, Training and Equipment o Software o Project personnel and counterpart training o Networking, colloquia etc. o Computers, digitizing photocopying, GIS and communications equipment	-Training achieved		
-Systems Research o In house o Contractual o Special studies	-Research undertaken -Results in hand		

ANNEX C

Statutory Checklist

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A includes criteria applicable to all projects. Part B applies to projects funded from specific sources only: B(1) applies to all projects funded with Development Assistance; B(2) applies to projects funded with Development Assistance loans; and B(3) applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 1988 Continuing Resolution Sec. 523; FAA Sec. 634A. If money is sought to obligated for an activity not previously justified to Congress, or for an amount in excess of amount previously justified to Congress, has Congress been properly notified?	A Congressional Notification will be forwarded in FY 1989.
2. FAA Sec. 611(a)(1). Prior to an obligation in excess of $500,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance, and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	(a) Yes. (b) Yes.
3. FAA Sec. 611(a)(2). If legislative action is required within recipient country, what is the basis for a reasonable expectation that such action will be completed in time to permit orderly accomplishment of the purpose of the assistance?	N/A

4. FAA Sec. 611(b); FY 1988 Continuing Resolution Sec. 501. If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See A.I.D. Handbook 3 for guidelines.)	N/A
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability to maintain and utilize the project effectively?	N/A
6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.	Yes. This is a regional project.
7. FAA Sec. 601(a). Information and conclusions on whether projects will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	N/A
8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	This project will encourage private U.S. participation in the foreign assistance program by contracting for U.S. commodities and U.S. technical assistance.
9. FAA Secs. 612(b), 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.	Under this project's buy-in arrangements, host governments will be encouraged to institutionalize and finance early warning systems.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? — No.

11. FY 1988 Continuing Resolution Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity? — N/A

12. FY 1988 Continuing Resolution Sec. 553. Will the assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel? — No.

13. FAA Sec. 119(g)(4)-(6). Will the assistance (a) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (b) be provided under a long-term agreement in which the recipient country agrees to protect ecosystems or other wildlife habitats; (c) support efforts to identify and survey ecosystems in recipient countries worthy of protection; or (d) by any direct or indirect means significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas?

(a) No.
(b) No.
(c) No.
(d) No.

14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (either dollars or local currency generated therefrom)?	N/A
15. FY 1988 Continuing Resolution. If assistance is to be made to a United States PVO (other than a cooperative development organization), does it obtain at least 20 percent of its total annual funding for international activities from sources other than the United States Government?	Although it is not yet known whether any PVOs will receive grants or subgrants, any such PVO recipients will meet the 20% non-U.S. financing test.
16. FY Continuing Resolution Sec. 541. If assistance is being made available to a PVO, has that organization provided upon timely request any document, file, or record necessary to the auditing requirements of A.I.D., and is the PVO registered with A.I.D.?	N/A
17. FY 1988 Continuing Resolution Sec. 514. If funds are being obligated under an appropriation account to which they were not appropriated, has prior approval of the Appropriations Committees of Congress been obtained?	N/A
18. FY Continuing Resolution Sec. 515. If deob/reob authority is sought to be exercised in the provision of assistance, are the funds being obligated for the same general purpose, and for countries within the same general region as originally obligated, and have the Appropriations Committees of both Houses of Congress been properly notified?	N/A
19. State Authorization Sec. 139 (as interpreted by conference report). Has confirmation of the date of signing of the project agreement, including the amount involved, been cabled to State L/T and A.I.D. LEG within 60 days of the agreement's entry into force with respect to the United States, and has the full text of the agreement been pouched to those same offices? (See Handbook 3, Appendix 6G for agreements covered by this provision).	There will not be a Project Agreement

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FY 1988 Continuing Resolution Sec. 552 (as interpreted by conference report). If assistance is for agricultural development activities (specifically, any testing or breeding feasibility study, variety improvement or introduction, consultancy, publication, conference, or training), are such activities (a) specifically and principally designed to increase agricultural exports by the host country to a country other than the United States, where the export would lead to direct competition in that third country with exports of a similar commodity grown or produced in the United States, and can the activities reasonably be expected to cause substantial injury to U.S. exporters of a similar agricultural commodity; or (b) in support of research that is intended primarily to benefit U.S. producers?	No.
b. FAA Secs. 102(b), 111, 113, 281(a). Describe extent to which activity will (a) effectively involve the poor in development by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, dispersing investment from cities to small towns and rural areas, and	The intended beneficiaries of this project are the large numbers of subsistence food producers who live in vulnerable areas of famine-prone countries. As the most seriously impacted, during famine are women and children,

92

insuring wide participation of the poor in the benefits of development on a sustained basis, using appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward a better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries.	their status will improve. Aside from precluding loss of life and reducing human suffering, an effective early warning system can enhance economic development. FEWS is a data analysis project for famine early warning and must depend on national and regional agencies for much of its data. Therefore, regional cooperation will be encouraged and local monitoring will improve as well
c. FAA Secs. 103, 103A, 104, 105, 106, 120-21. Does the project fit the criteria for the source of funds (functional account) being used?	Yes.
d. FAA Sec. 107. Is emphasis placed on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?	There is no appropriate technology element in this famine early warning system activity.
e. FAA Secs. 110, 124(d). Will the recipient country provide at least 25 percent of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?	N/A
f. FAA Sec. 128(b). If the activity attempts to increase the institutional capabilities of private organizations or the government of the country, or if it attempts to stimulate scientific and technological research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority?	Yes, subsistence farmers and their families are especially vulnerable to famine. Improved national early warning capabilities will facilitate mitigation of famine related dislocation.

g.	FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.	The program addresses a preparedness for future emergencies and is designed to utilize locally-based institutions and resources to the maximum extent possible.
h.	FY 1988 Continuing Resolution Sec. 538. Are any of the funds to be used for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions?	No.
	Are any of the funds to be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any person to undergo sterilizations?	No.
	Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning?	No.
i.	FY 1988 Continuing Resolution. Is the assistance being made available to any organization or program which has been determined to support or participate in the management of a program of coercive abortion or involuntary sterilization?	No.
	If assistance is from the population functional account, are any of the funds to be made available to voluntary family planning projects which do not offer, either directly or through referral to or information about access to, a broad range of family planning methods and services?	No.

j.	FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	Yes.
k.	FY 1988 Continuing Resolution. What portion of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, colleges and universities having a student body in which more than 20 percent of the students are Hispanic Americans, and private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)?	It is anticipated the major technical assistance contract will be awarded using full and open competition. Remaining implementation contracts will be awarded to the extent possible to such targeted enterprises.
l.	FAA Sec. 118(c). Does the assistance comply with the environmental procedures set forth in A.I.D. Regulation 16? Does the assistance place a high priority on conservation and sustainable management of tropical forests? Specifically, does the assistance, to the fullest extent feasible: (a) stress the importance of conserving and sustainably managing forest resources; (b) support activities which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and help countries identify and implement alternatives to colonizing forested areas; (c) support training programs, educational efforts, and the establishment or strengthening of institutions to improve forest management; (d) help end destructive slash-and-burn agriculture by supporting stable and productive farming practices; (e) help conserve forests which have not yet been degraded by helping to increase production on lands already cleared	Yes.

or degraded; (f) conserve forested watersheds and rehabilitate those which have been deforested; (g) support training, research, and other actions which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing; (h) support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation; (i) conserve biological diversity in forest areas by supporting efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis, by making the establishment of protected areas a condition of support for activities involving forest clearance or degradation, and by helping to identify tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas; (j) seek to increase the awareness of U.S. government agencies and other donors of the immediate and long-term value of tropical forests; and (k)/utilize the resources and abilities of all relevant U.S. government agencies?

m. FAA Sec. 118(c)(13). If the assistance will support a program or project significantly affecting tropical forests (including projects involving the planting of exotic plant species), will the program or project (a) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land, and (b)/take full account of the environmental impacts of the proposed activities on biological diversity? N/A

n.	FAA Sec. 118(c)(14). Will assistance be used for (a) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner and that the proposed activity will produce positive economic benefits and sustainable forest management systems; or (b) actions which will significantly degrade national parks or similar protected areas which contain tropical forests, or introduce exotic plants or animals into such areas?	No
o.	FAA Sec. 118(c)(15). Will assistance be used for (a) activities which would result in the conversion of forest lands to the rearing of livestock; (b) the construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands; (c) the colonization of forest lands; or (d) the construction of dams or other water control structures which flood relatively undegraded forest lands, unless with respect to each such activity an environmental assessment indicates that the activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development?	No
p.	FY 1988 Continuing Resolution If assistance will come from the Sub-Saharan Africa DA account, is it (a) to be used to help the poor majority in Sub-Saharan Africa through a process of long-term development and economic growth that is equitable, participatory, environmentally sustainable, and self-reliant; (b) being provided in	This activity is to alleviate the impact of famine, thus, contributing to longer term development. By assuring early warning, host government and donors alike can better plan so that populations are not forced to

accordance with the policies contained in section 102 of the FAA; (c) being provided, when conistent with the objectives of such assistance, through African, United States and other PVOs that have demonstrated effectiveness in the promotion of local grassroots activities on behalf of long-term development in Sub-Saharan Africa; (d) being used to help overcome shorter-term constraints to long-term development, to promote reform of sectoral economic policies, to support the critical sector priorities of agricultural production and natural resources, health, voluntary family planning services, education, and income generating opportunities, to bring about appropriate sectoral restructuring of the Sub-Saharan African economies, to support reform in public administration and finances and to establish a favorable environment for individual enterprise and self-sustaining development, and to take into account, in assisted policy reforms, the need to protect vulnerable groups; (e) being used to increase agricultural production in ways that protect and restore the natural resource base, especially food production, to maintain and improve basic transportation and communication networks, to maintain and restore the natural resource base in ways that increase agricultural production, to improve health conditions with special emphasis on meeting the health needs of mothers and children, including the establishment of self-sustaining primary health care systems that give priority to preventive care, to provide increased access to voluntary family planning services, to improve basic literacy and mathematics especially to those outside the formal educational system and to improve primary education, and to develop income-generating opportunities for the unemployed and underemployed in urban and rural areas?

deplete scarce resources (including those which lead to environmental degradation). This project is aimed at improving health conditions by providing early warning of famines This is especially true for mothers and children as they are most seriously affected by famine.

2. Development Assistance Project Criteria (Loans Only)

a.	FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan at a reasonable rate of interest.	N/A
b.	FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20 percent of the enterprise's annual production during the life of the loan, or has the requirement to enter into such an agreement been waived by the President because of a national security interest?	N/A
c.	FY 1988 Continuing Resolution. If for a loan to a private sector institution from funds made available to carry out the provisions of FAA Sections 103 through 106, will loan be provided, to the maximum extent practicable, at or near the prevailing interest rate paid on Treasury obligations of similar maturity at the time of obligating such funds?	N/A
d.	FAA Sec. 122(b). Does the activity give reasonable promise of assisting long-range plans and programs designed to develop economic resources and increase productive capacities?	N/A

3. Economic Support Fund Project Criteria

a.	FAA Sec. 531(a). Will this assistance promote economic and political stability? To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of Part I of the FAA?	N/A
b.	FAA Sec. 531(e). Will this assistance be used for military or paramilitary purposes?	N/A
c.	FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?	N/A

ANNEX D

Methods of Implementation and Financing

METHODS OF IMPLEMENTATION AND FINANCING
($000)

Method of Implementation	Method of Financing	1989 Estimate	1990 Estimate	1991 Estimate	Total Estimate
Technical Assistance	Direct Contracts	$2,230,000	$2,230,000	$2,220,000	$6,680,000
Technical Assistance	RSSAs/PASAs	340,000	340,000	340,000	1,020,000
Institutional Support	Grants/Ltr of Credit	330,000	330,000	340,000	1,000,000
Training	Direct Contracts	100,000	100,000	100,000	300,000
Total		3,000,000	3,000,000	3,000,000	9,000,000

ANNEX E

Technical Analyses

1. Agro-Climatic Indicators
2. Socio-Economic Indicators
3. The Geographic information System

ANNEX E-1

USING AGROCLIMATIC DATA IN A FEWS

A. The Role of Agroclimatology in Famine Early Warning

For many people, drought and related crop losses, have been the major cause of famine in Africa. Thus, the failure of the rains has been the most commonly used early warning indicator, and much effort has been channeled into understanding, monitoring and forecasting precipitation in Africa. Drought, from this perspective, is seen as a direct precursor of famine in causing crop production and pasture declines, price increases, and food deficits.

There is the alternative view which sees famine emerging primarily from the socioeconomic system, stemming from poverty, inappropriate land uses, population growth or civil strife. From this perspective, drought may have little or no role in causing famine, or may just be a trigger that pushes a vulnerable socio-economic system over a threshold (e.g., Garcia, 1981).

There is no question, however, that drought has been, and will continue to be, one of the major factors affecting food production and food security in much of Africa. Thus, agroclimatology, the subdiscipline that deals with the relationships between climate and agricultural production, has a lot to contribute to the understanding of drought and famine in Africa. Agroclimatological measures, combined with an understanding of socio-economic vulnerability, will have to be a key component of any famine early warning system. Agroclimatological measures include meteorological variables such as surface temperature and rainfall; observed and derived soil moisture, crop condition and yield assessments; and remotely sensed indicators of land surface and atmospheric characteristics such as vegetative biomass or cloudiness.

It is important to clarify terminology by distinguishing between climatology--the analysis of prevailing or average conditions of rainfall, temperature etc., and meteorology--the analysis of the instantaneous state (temperature, moisture, pressure etc.) of the atmosphere, often called the weather. The terms and practices of climatology and meteorology are closely linked in that accumulated meteorological information is used to construct and interpret climatological information. Thus FEWS uses both meteorological and climatological information in trying to compare the instantaneous conditions of the weather in Africa (e.g., it is raining in Mali) to the longer term statistical characteristics of the climate (e.g., accumulated

seasonal rainfall in Mali is only eighty percent of the long term average). A similar distinction can be made between agroclimatology -- the analysis of average and accumulated crop-climate conditions, and agrometeorology -- the analysis of crop-weather relationships. Again, both are important to FEWS.

The primary use of agroclimatological information in a famine warning system is to provide early indications of the magnitude and location of crop production declines and of stressed pastures which might trigger livestock losses and human migrations. The goal is to make production estimates as soon as possible and to use them to focus in on critical regions and vulnerable populations, and, if necessary,to initiate food aid or other appropriate interventions.

B. The Current US AID Famine Early Warning System (FEWS)

The USAID's Famine Early Warning System (FEWS) uses agroclimatological information extensively, and collects a number of indicators from a variety of sources. Although there are shifts in emphasis, depending on events and between countries, the general types and uses of agroclimatological information in the current FEWS seem to be as follows :

1. Rainfall station data are obtained from several sources:

a. Price Williams (PWA) obtains 10 day summaries for the major synoptic stations in FEWS countries from the World Meteorolgical Organisations (WMO) Global Telecommunication System (GTS) via the National Oceanic and Atmospheric Administrations (NOAA) Climate Analysis Center.

b. FEWS field representatives obtain data (again usually 10 day summaries) from national meteorological services. The stations include those on the GTS and sometimes, with delays, a more extensive network.

c. Depending on the country rainfall, data have a lag time of one to four weeks. Temperature data are also available from the same sources as well as other meteorological variables such as wind, cloudiness, and soil moisture estimates, but these information do not currently play a major role in FEWS.

2. Remote sensing data in the form of Normalized Vegetation Indices (NVI) are obtained by PWA from NASA at an 8x8 km scale averaged and composited for ten day periods. In some cases PWA and in country FEWS also use remote sensing products developed for other programs (e.g., USGS/EROS NVI 1x1 km (detailed) products for grasshopper/locusts). In the early stages of FEWS the NVI was obtained by FEWS/PWA, AGRHYMET and country meteorological services at a 1x1/2 degree (coarse) scale from the NOAA/NESDIS Climate Impact Assessments for Africa. The NASA NVI have lags of about one week in getting to US analysts, and two to four weeks in those cases where the information is sent to Africa. PWA has also started to look at Meteosat images for qualitative assessments and for locating the progress of the Intertropical Convergence zone (ITCZ).

3. Agricultural statistics are obtained by FEWS field representatives from host governments. These statistics can include planting dates, crop conditions, and production estimates for different regions of a country. These data are produced with delays of one to three months. In addition FEWS makes use of reports from other donors, international agencies (e.g., FAO), non-governmental organisations (NGOs), and other U.S. government programs (e.g., USDA, Food for Peace).

4. At different times and places FEWS, especially at the field level, obtains a range of other localised, often irregular reports on hydrology, field conditions, livestock, yields, cloud cover and range conditions. FEWS is being designed during a period of rapid change in monitoring technologies, an expansion of statistical data collection systems in many countries, the development of other early warning systems, and severe economic and institutional constraints in both Africa and USAID. It is critical, therefore, to identify priority indicators, to find effective and economic ways of collecting them, to establish contexts for interpretation, and to establish frameworks for evaluating their performance and credibility.

C. Other Early Warning Systems

Other early warning systems, such as the FAO Global Information and Early Warning System (GIEWS), use very similar agroclimatological information to USAID FEWS. Most international and national systems use station rainfall and field monitoring of crops to provide early warnings of crop deficits. There is increasing interest in the use of soil moisture balance and crop yield models and in the use of remote sensing products such as the NVI for early warning and crop monitoring purposes. In many

cases meteorology and agricultural departments and personnel are key members of national drought, early warning or food security committees. In the West African Sahel a regional center, AGRHYMET, has been established to coordinate agricultural, hydrological and meteorological information, training and research within the region.

D. Review of potential indicators

In an ideal world there would be no famine, and in an ideal famine early warning system the agroclimatological indicators would be theoretically sound, timely, comprehensive in geographical and historical coverage, credible, easily available and cheap. There are, however many problems in obtaining indicators that meet these criteria. This section of this technical annex reviews the types of agroclimatological information that FEWS might use and their limitations.

E. Meteorology and Hydrology

Ideally, the earliest warning of possible problems would be a long range climate forecast six months before the beginning of the growing season. Such a capability is unlikely in the near future although some research suggests that sea surface temperatures correlate with and anticipate precipitation in some parts of Africa (Farmer et al. 1985) In the absence of climate forecasting capability, and because many subsaharan soils are dry at the beginning of the growing season, we must wait until the beginning of the rainy season to initiate even the most general estimation procedures.

The exception is irrigated agriculture where abnormally low reservoir, river or lake levels may give very early warning of potential problems. The current FEWS reports occasional hydrological information--for example an alert this year in Mauritania because of low flows in the Senegal river resulting from the filling of an upstream dam--but neither FEWS nor other EWS are collecting such data in a systematic or timely fashion. In those countries where irrigated and recession agriculture is important (probably all FEWS countries) FEWS should identify areas where such hydrological early warnings can be given and attempt to obtain appropriate data from national hydrological services, river basin commissions, and field projects.

There are key atmospheric disturbances that can be used as early warning indicators at a large, almost continental scale. For example, the position of the intertropical convergence zone (ITCZ), which marks the northward movement of the rains in the Sahel, can also give a few weeks warning of a delay in the rains and of subsequent production problems at a regional scale. In some years the ITCZ moves more slowly, or is blocked in its northward shift, however its rate and limit of movement cannot always be extrapolated. FEWS should however monitor the position and progress of the ITCZ as the first indicator of rainfall problems. The ITCZ can be plotted from qualitative interpretations of Meteosat satellite cloud images, and from synoptic meteorological station observations such as those available on WMO's global telecommunications system (GTS).

Station rainfall data are probably used more often than any other measure in existing famine early warning systems. Although there are many meteorological stations in Sub-Saharan Africa only a few of them report data on a frequent and timely basis and the density of such stations tends to be lower in the famine prone desert margins and in areas remote from administrative centers. The most timely reports come from those synoptic stations that report on the World Meteorological Organisations's GTS network, and most national meteorological services use these stations--often in airports or urban areas, plus a few others in major commercial agricultural areas, to produce reports every ten to thirty days during the rainy season. The reliability of the data, the density of the station network, and the publication delays vary greatly by country with Mauritania and the Sudan having particularly severe problems in the last few years. There are often errors in the GTS reports--NOAA's Climate Analysis Center (a current source of FEWS data) have both human and automated error correction procedures.

Problems with the accuracy and coverage of the GTS data mean that FEWS does and should obtain other information at the field level from national meteorological services. Most services issue regular reports during the rainy season. Unfortunately even the national services encounter delays in obtaining information from remote non-automated stations and it is sometimes possible to get information faster from these stations using field contacts (NGOs) or other agencies (National Agriculture Services or FAO). AGRHYMET is trying to coordinate and facilitate the improvement of agrometeorological services in West Africa but cannot currently be considered a timely source of information.

Although some people have suggested that an expansion of the synoptic station network would greatly assist in early warning, the nature of African rainfall is such that many important storms are localised, and occur between stations regardless of network density. Greater payoff may be found in the refinement of rainfall estimation procedures based on satellite cloud images (Barrett and Martin, 1981), and in the upgrading of existing meteorological stations, particularly in communication capability. Information may also be added by using daily data (most current reporting is of 10 day averages) to better assess the variability and intensity of African rainfall. Currently FEWS takes little obvious advantage of either the qualitative or quantitative information available from Meteosat which could be used to confirm and interpolate station rainfall data. In the future FEWS should take advantage of such rainfall estimates, which seem to be gaining credibility, and which will be made within the new FAO ARTEMIS system. This information could be obtained from either a US based METEOSAT receiver, from one in Europe (e.g., FAO) or in Africa (if stations are built) with interpretation by skilled agrometeorologists.

A reliable early season indicator at the more local level will be the actual date of onset of the rains. This can be monitored using the combination of station reports, satellite cloud images and field observations. It has been noted that a delay of more than two weeks in the onset of the rains in many African countries should be a priority indicator of problems in socioeconomically vulnerable areas (Hayward and Oguntoyinbo, 1987).

F. Crop conditions and agricultural statistics

Planting and replanting dates are usually available from agriculture departments, and are also planned as part of the national AGRHYMET reporting framework. However the information is currently subject to delays (2-4 weeks) and often omits certain crops and regions. Improvements are likely with improved statistical services (stimulated by programs like DiaPer and AGRHYMET). The date and initial magnitude of the rains, combined with information on planting and replanting dates should be highlighted in FEWS reports and the qualitative implications for crop production presented based on an understanding of the crop calendar in each region.

There are several routes to estimating and monitoring crop production once the growing season has begun. Direct field observations of the crop and pasture conditions can play an important role in early warning efforts. In the current FEWS, field data are collected from agriculture departments, from NGOs, and from observations taken during field trips. Unfortunately the data from agriculture departments is often delayed because of communication problems. It is not based on carefully sampled and taken measurements, and the NGO and trip reports can be localised and anecdotal. In the future, the within season crop monitoring is likely to improve in most countries with the assistance of programs like DiaPer. For example the government of Burkina Faso is starting to issue a "Bulletin Rapide" during the growing season which reports on crop conditions every month with about two weeks delay. In other countries, however, such information may be published very late in the season, if at all, and cannot be used in early warning.

The importance of the qualitative assessments of farmers and extension agents should not be underestimated since they often have the experience to make good intuitive judgements of crop and pasture prospects (Richards,1985). The challenge is to find ways to survey and summarise these assessments. FEWS should continue to collect direct observation data for its own importance in early warning, and as a cross reference for remote sensing, meteorological and model estimates. Information on the progress of the crop calendar and phenology (e.g. germination, flowering dates) is very important as it helps in the interpretation of other indicators such as water balance indices. In some cases the GIS and computing capability of local FEWS may be able to facilitate the organisation, analysis and publication of these data, although most agriculture departments are receiving assistance from several donors. Coordination and sharing of information with agricultural departments is therefore a critical role for the FEWS field representatives. In many cases FEWS will also need to coordinate with the AID mission agricultural and food aid activities and with other initiatives like Diaper.

In most countries the government agricultural statistics service will produce a production estimate just before harvest and a final crop assessment several months later. In certain countries the political sensitivity of production estimates result in considerable delays in the publication of reports, and debates about the credibility of the information. It is in these countries that FEWS

may be most useful in collecting whatever data are available and summarising them. In many countries the focus of data collection is on cereals even in areas where roots or vegetables are important. Agricultural services also try to report on pasture conditions and other aspects of livestock production but as with other measures the timeliness, spatial coverage and reliability of this information varies between countries and is generally not useful for famine early warning. For the near future, FEWS, like everyone else, will probably have to rely on delayed cereal production estimates, and sparse information on other food and livestock. FEWS reporting should, on a country basis, make it clear when other foods and livestock may be critical indicators and are unreported, not for lack of importance, but for lack of good information.

G. Remote sensing

The last five years have seen a major advance in agroclimatological monitoring in Africa in the form of satellite remote sensing. The great advantage of satellite imagery is that it provides comprehensive spatial coverage, filling in the gap between meterological stations and giving general indications of environment and vegetation conditions in advance of ground observation (Hutchinson, 1986). Although several satellites and methodologies have been used for research in Africa there are really only two activities that provide information on a frequent and regular basis. (a) the use of NOAA AVHRR data to construct Normalised Vegetation Indices at various levels of detail and (b) the use of Meteosat cloud images to derive qualititative and quantitative estimates of rainfall.

The NOAA Advanced Very High Resolution Radiometer (AVHRR) measures the energy reflected from the earth's surface in several wavebands. It provides daily coverage for most of the earth's surface and the digital information obtained by the satellite can be received as the satellite passes overhead or by the retransmission of recorded data to central receiving stations. Although the satellite has a resolution of about 1 km (LAC), recording limititations mean that the global data recieved in the U.S. is generally sampled and provides a 7km resolution (GAC). Although there are several satellites, such as LANDSAT and SPOT, which have much higher resolutions, it is generally agreed that the NOAA AVHRR is the most cost effective source of daily, large area remote sensing information (Hutchinson, 1986; Hervio, 1987).

Both FEWS and the FAO EWS receive processed AVHRR data from NASA in the form of of the Normalised Vegetation Index at the 8x8 km resolution for each 10 day period. Agrhymet has been receiving an NVI from NOAA/NESDIS at a very general 1 degree by 1/2 degree resolution. Since green vegetation absorbs red sunlight and reflects near infrared radiation the presence and growth of vegetation can be identified by comparing the relevant spectral bands of satellite data. The most widely used ratio is the Normalized Difference Vegetation Index (ratio of difference between infrared and red values divided by the sum of these values). This index is an indicator of biomass vigor and can be used to track vegetative development during the growing season. The existence of a five year archive of the index means that comparisons can be made to previous years using difference maps or graphs for particular locations. In general, the NVI has been used as a qualitative indicator of crop and pasture conditions although NOAA/NESDIS has produced some monthly crop yield forecasts based on correlations with the index. Under the grasshopper-locust emergency programs USAID has been receiving maps of 1km resolution NVI from USGS/EROS.

Despite some of the problems in using and interpreting the NVI (described below), it is clear that NVI maps, in particular, are playing a key role in FEWS and should continue to do so. The maps help to target areas where drought may be developing, and stimulate more detailed climatological analysis and field observations. They also seem to play an important pedagogic and communications role in graphically and colorfully portraying the potential severity of conditions for decision makers.

Although the 1 km (LAC) data provides useful detail comprehensive LAC data will not be available until there are local recieving stations in Africa. As discussed below, there are likely to be delays in reaching regular reporting capability at the proposed station at AGRHYMET in Niamey. In the mean time FEWS should continue to obtain 8 x 8 km NVI decadal data in a form that can be used for maps and comparisons.

It is important to recognize the problems in the use of remote sensing information if satellite imagery is to be a core and credible component of FEWS. These limitations should be made clear in the communication and interpretation of the NVI indices and maps. Remote sensing and NVI's are most appropriate where agricultural regions are uniform and woody vegetation is low. Subsaharan Africa, with small, scattered fields, growing

several crops amongst small woody shrubs, is one of the more difficult environments for interpreting ground cover. It is in this type of environment, more than any other, that ground truthing is important, based both on particular experiments like those of the French Espace project, and on field checking by FEWS field representatives.

There are several ways in which atmospheric and ground conditions can bias or obscure the NVI. Clouds, topography, soil, and inhomogenous vegetation conditions all influence NVIs and can create artificial indications of ground vegetative conditions. These influences can be taken into account in careful image interpretation with skilled knowledge of field conditions. In a similar way the problems of satellite drift, angle of view, sun angle, and atmospheric conditions like dust, are important and difficult for which to correct. Most estimates average or composite images over several time periods and picture elements (pixels) in the attempt to eliminate some of these factors. But the correction is always partial and the resulting index is sometimes an artifact of the correction and interpretation procedure. The numerical values of NVIs that result from these interpretations can give a false impression of accuracy that is not always communicated, particularly to the field.

In a similar way, the color and shading schemes used in images can create a false impression that the viewer is seeing the true surface. There is some confusion between the color scheme used by NASA that used by USGS/EROS and that previously used by NOAA/NESDIS (the Ambrosiak color scheme). The methods are quite different and it should be noted that most African scientists have been trained by NOAA.

It is clear that the NVI is a useful and increasingly integral part of FEWS in both Washington and the field. It is not clear that it is being used with sufficient caution in relation to corrections, interpretations and needed ground truthing. Whoever makes the NVI calculations and images for FEWS, they should use the state of the art correction and interpretation procedures. The NVIs should be made available to the field in a timely fashion with at least the 8x8 km scale so that NVI maps and difference graphics can be produced in country and compared to local knowledge of environmental conditions and crop regions. NVI products are also a valuable product for FEWS field personnel in discussion and information exchange with host governments. Host government and FEWS field personnel

should be trained to in the use of the products according to the most up to date colorisation and correction schemes. FEWS should also do as much as possible to enhance regional capability for constructing NVIs through facilities such as AGRHYMET in Niamey and remote sensing centers in Nairobi.

Other satellites can provide information of use in early warning in Africa at higher resolution (more detail) but generally at higher cost. At a minimum FEWS might consider piggybacking on baseline resource assessment projects that use satellites like Landsat and Spot to identify cropping and livestock areas. And, for particularly vulnerable regions, or those with highly complex topography FEWS might consider selected sampling using higher resolution satellites or aerial photography at one or two critical points within the growing season.

The reported improvements in precipitation estimation procedures based on METEOSAT images should also be part of FEWS because these techniques allow for estimation of rainfall between the sparse station networks of Africa. These estimates should be compared to station reports and the NVI used within FEWS in order to build confidence in the value of Meteosat in an early warning system. The experience of USDA's Joint Agricultural Weather facility suggests that Meteosat is a useful qualitative indicator and FAO plans to use quantitiative estimates based on a technique developed at Reading in the ARTEMIS early warning system.

H. Soil moisture and water balances

During the growing season meteorological conditions can be used to anticipate crop and pasture productivity. Since up to three quarters of the variation in yields in Africa is determined by variations in rainfall, precipitation is a critical correlate of final yield. Both station reports and satellite estimates can be used in number of ways. Cumulative rainfall can be compared to previous years to provide a simple measure of relative deficit or decadal conditions can be tracked with the crop calendar to identify periods of particular sensitivity and stress. Historical data can be used to provide rankings, percentiles, and probabilities of current conditions. It should be noted that most archives and comparisons are for the post 1960 period which includes an unprecendented decline in rainfall over much of Africa and cannot, perhaps, be seen as a "normal" or "average" baseline (Farmer et al 1985).

It is important to recognize that rainfall is not the direct agroclimatological determinant of crop and pasture condition although it may be the easiest to measure and interpret. The moisture available to plants is also dependent on other variables such as temperature and winds which are collected by meteorological station networks. These data are collected but are rarely used as part of the drought or agricultural production early warning estimates. AGRHYMET is encouraging the use of agrometeorological data to construct soil moisture balances and water deficit indices using an FAO methodology, but these too are not routinely used to make early warnings.

The FAO method compares the water needs of crops at various stages to the water available (Doorenbos and Kassam, 1979; Frere and Popov 1979). The water need depends on the crop type and crop growth stage, and water availability depends on effective precipitation and evapotranspiration. A water satisfaction index is computed (as a percent) every seven or ten days during the growing season. As the end of the growing season approaches the index has been shown to correlate more and more closely with the final yield. The degree to which the index represents potential yield problems across wide areas is limited by the station networks and by knowledge about where specific crops are grown. Where indices are currently calculated at the national level, the "crop" is often assumed to be grass (e.g., in Burkina). FAO plans to extend the use of this index by reporting it in the ARTEMIS system. The FAO method is the most widely accepted moisture budget procedure in Africa and is the most appropriate index for FEWS to use. It should probably be obtained and encouraged within national agrometerological networks, from FAO or from AGRHYMET, rather than taking the time to compute it in the US. However, it does have flaws and is not the only method available. Although these indices integrate agroclimatological information and provide a sound scientific basis for monitoring the growing season it is not yet clear that FEWS or government analysts find that these indices add much value over simple rainfall statistics in early warning efforts.

I. Crop Yield Models

Crop yield models, based on early season agrometerological data, have also been used in early warnings of production deficits (NRC, 1987; Baier, 1983; Biswas, 1980). The mechanisms of crop growth and development are extremely complex and numerous attempts

have been made to model relationships between climate and crop yields. Because of the wide variation in crop types and environments there is no likelihood of a theoretically comprehensive, universal, model that can provide regular, timely, regional forecasts. Most models used for regular forecasts are based on empirical relationships between meteorological and crop growth parameters. This empirical basis requires good historical time series for as many crop types, environmental conditions, and regions as might be envisaged in the early warning system. Experimental station data are inappropriate for building large area yield models, especially in Africa where experimental yields can be several times higher than those in farm fields.

FEWS briefly used yield forecasts produced by NOAA/NESDIS which were based on relationships between rainfall and yields, the NVI and yields, and the FAO moisture index and yields. These models were severely limited by data availability and were criticised by the NRC (1987) and others for problems such disparities between forecasts and observed yields. Nevertheless some AID decision makers and African scientists found these estimates useful in providing rough estimates of possible crop deficits.

Because good historical time series are not available in most of Africa the utility of crop yield models in the near future for early warning systems is doubtful. Nevertheless groups such as NOAA/NESDIS and the ESPACE project have produced yield forecasts. Because of the credibility problems, and because crop yield modeling may not be cost-effective across broad regions, FEWS should not devote a lot of resources or time to crop yield models. If yield forecasts are made easily available by FAO or AGRHYMET the information could be cautiously compared to other indicators and to field observations and, if credible, eventually incorporated as a key indicator.

J. Summary

Agroclimatological data are also important in providing alerts of non-drought threats to food security especially for warnings about pests like grasshoppers and locusts. In both East and West Africa meteorological data and satellite derived vegetation indices are being used to identify and target conditions conducive to pest outbreaks. It should be noted that other factors can

cause crop production declines, especially difficulties in obtaining inputs (e.g., seeds, fertiliser), management problems, other natural disasters, or civil strife, and that agroclimatology plays a small role in warning of such problems.

The discussion above has highlighted key agroclimatic early warning indicators, discussed some of their problems and made some recommendations regarding their future use in FEWS. It is extremely important to recognise that indicators cannot be used in isolation but are often needed to confirm each other. Station rainfall and NVIs need to be compared for one to validate the other and thus expand the coverage for rainfall. NVIs must be validated by rainfall reports and by reports of crop conditions in the field. One must not overlook the value of ground truth in a FEWS budget with expensive high technology and remote sensing components. And at the field level FEWS efforts should include field expeditions when necessary to collect and confirm information which is not always available in capital cities.

K. The Importance of a Geographical and Historical Context for Interpreting Agroclimatological Information

For almost all of the indicators described above, early warnings risk inaccuracy and poor credibility if indicators are interpreted out of context. For example, it is extremely important to know if agroclimatological anomalies are occuring in rainfed crop, irrigated crop, pasture, or even unused regions. Only 10 percent of the land area of Burkina is used for crops, and less than 3 percent in Chad, Mali, Niger and Mauritania. Even pasture is less than 50 percent of the land area in most countries. This implies a knowledge, and if possible, a systematised geographic data base, of the basic physical and agricultural geography of a region identifying major land use types and crop areas. Although such systems are currently being developed in FEWS, it is not being given enough priority and standards and detail vary between countries and analysts. In the long run, the mapping of key land uses and agricultural regions (which do not change very rapidly in Africa) will lead to time and cost savings in interpreting other indicators by focusing attention and data collection on critical production and pasture regions.

The one major change that FEWS should make is to attempt to track the extent of the land degradation which is occurring rapidly in many regions. This information is sometimes collected by FEWS field representatives but is

not clearly linked to vulnerability assessments. This will be difficult to do as there is little systematic reporting of trends in soil erosion, salinisation, deforestation, and water source depletion. But where such data are available they should be integrated into the FEWS knowledge base. In the same way that nutritional assessments can indicate the increasing vulnerability of a population, reports of significant declines in water, wood or soil resources can indicate the increasing vulnerability and fragility of a resource base.

Land use and crop area maps can be fairly general because it is impossible to capture in detail the tremendous heterogeneity of African land uses with small fields, intercropping, different types of irrigation, agroforestry and agropastoralism. General crop area maps may even substitute for detailed information on crop area planted in each growing season. An early warning of crop production problems requires not only yield estimates but also a measure of area planted to different types of crops. Although some agricultural departments report estimates of crop areas planted early in the season these are often revised after the harvest and are seen as unreliable. Crop areas cannot be identified using AVHRR satellites and it is unlikely that FEWS could use higher resolution satellites to estimate areas because of cost, analysis time, and the heterogeneity described above. USDA Foreign Agriculture service has developed fairly efficient ways of estimating areas of commercial crops--but mostly in regions with more homogenous crop areas and types. FEWS can, of course, use land use maps developed under other programs such as the proposed Sudan Resource Base Management Study or the Dirol Plains project in Mauritania.

The accurate identification of climatic or agricultural anomalies in FEWS requires a comprehensive geographical and historical data base. Anomalies can be defined in both space and time as events that lie outside the normal or average expected conditions. In a practical sense this involves making the development of a geographically referenced information system containing historical time series a core component of FEWS. At a minimum this system should contain time series for decadal rainfall at as many stations as possible, archived vegetation indices at the 8x8 km scale, reported crop yield data by crop district, the boundaries of these districts and other key administrative units, land capability information in the form of soil type and topography, and general land use patterns in terms of usual crop regions, types and pastoral areas.

This archival and GIS activity tends to play a secondary role to information collection and report publication in the current FEWS project. It is evident that both Washington and field analysts recognise the importance of being able to compare current to past conditions in a qualitative, statistical and cartographic sense and that they see the need to build credibility by comparing their warnings and estimates to what actually occurs. Some of the most useful insights provided by FEWS occur when rainfall or vegetation indices are compared to the averages and extremes in the historic archive and any anomalies then georeferenced to specific administrative units and land use types.

The archive is also important in building confidence about FEWS forecasts and estimating the uncertainty therein. The more that FEWS can correlate indicators such as rainfall and vegetation indices with actual yields and production the more that FEWS analysts and users will develop confidence in making and acting on FEWS warnings. Careful analysis of the archive can also permit the inclusion of ranking and uncertainty in FEWS forecasts. An early season drought could be presented for example, as the one in 20 year drought with a precipitation deficit of this magnitude followed 80 percent of the time by a yield reduction of ten percent. Archives would also provide a basis for giving a quantitative indication of the reduction in uncertainty of estimates as the growing season progresses and indicators converge.

L. Using the Agroclimatological Components of FEWS to Enhance Other AID and Host Government Programs

There are many ways in which the agroclimatological indicators useful to FEWS can be obtained from or enhance other AID and host government emergency and development programs. Timely meteorological and vegetative information can alter the course of the growing season. For example, pesticides can be sprayed if conditions have been identified conducive to pest outbreaks. Lower crop planting densities or alternative employment opportunities can be identified if it is known that water may be scarce and herd movement or controlled livestock sales can be introduced as pasture declines. Historical archives and base maps can be used to identify land use potentials and risks in development programs and FEWS data can become a useful and integral part of research activities both within and outside USAID and host governments.

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100

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ANNEX E-2

USING SOCIO-ECONOMIC, HEALTH, AND NUTRITION INDICATORS IN FAMINE EARLY WARNING SYSTEMS

The use of indicators to track famine conditions implies a model of what triggers famine and how it spreads. Although there is general agreement on the socio-economic and nutritional indicators that signal the possible onset of famine early enough to enable action to prevent that outcome, this information is seldom collected systematically in any of the famine-prone countries of Africa. This FEWS project can, therefore, contribute significantly to the definition and refinements of indicators, to the strengthening of national reporting systems, and, ultimately, to the evolution of a more uniform and complete approach to famine early warning.

A. Famine and the Early Warning Model

Famine is most simply defined as widespread starvation. The dividing lines between hunger, starvation, and famine are difficult to draw precisely, even though each phrase denotes a distinctive phase of food deprivation. For expository purposes, hunger may be taken to be temporary food deprivation without significant physical consequences. Starvation is protracted deprivation that results in manifest physical consequences, such as weight loss and vitamin deficiencies. Famine is mass starvation: the two differ essentially in the numbers of people affected. Importantly, famine also denotes a breakdown in a society's institutional structures.

Famine is a problem of the poor because the richer and better connected people almost invariably are able to obtain more (even if insufficient) food. In the technical literature, this problem is discussed under the rubric of "entitlements," which is one way to speak of access to food. Put bluntly, the poor have fewer "entitlements" than the better off, and, therefore, they suffer the brunt of a famine. The key point here is that famine most affects those who are already on the edge of subsistence consumption. The famine process is thus a process of immiseration, of decapitalization of families and of their increasing impoverishment.

Famine is often thought of as a "creeping" disaster because it is commonly preceded by several years of poor harvests. During that time, people cope in various ways with the shortfalls in production. There comes a time,

122

however, when people can no longer cope with another shortfall. Systems of mutual support and of food distribution break down under the accumulated pressure, and famine overtakes the area. In other words, the onset of famine conditions may occur slowly, but once famine begins, it can spread rapidly among the vulnerable populations.

Civil war creates a similar situation, albeit for different reasons that greatly impede field verification. In areas where civil war rages, productive areas become battlefields and village food stocks provision government and insurgent troops. The population in this situation is brought to the edge of subsistence by the hostilities. Any new perturbation can trigger mass flight, as communities disintegrate and families flee or starve. The mass starvation that is famine is often associated with such a breakdown of regional institutions that could otherwise mitigate the disaster.

B. Socio-Economic and Health Indicators in Early Warning Systems

1. The socio-economic model of famine

Whatever the precise conjunction of causes that impoverish a people and put them at risk of famine, people cope with decreasing access to food supplies in several general ways. In the first instance, people attempt to obtain those resources that will enable them to obtain food. They may make recourse to traditional trade networks, such as the exchange of pastoral products for cereals. More unmarried men may migrate seasonally in search of wage labor; and, with increasingly difficult conditions at home, married heads of household may also leave to seek work elsewhere. Households who cannot resort to migrant labor successfully or for whom the scant wages are insufficient, will resort to the sale of small livestock or, later, to the sale of household or agricultural equipment in order to supplement their food stocks. (Such distress sales usually occur very late in the famine process, just before people abandon their homesteads.) In brief, people resort to strategies designed to increase their access to food, their "entitlement."

These strategies to obtain resources cannot succeed if food is unavailable in the area. Even where food is available, a small increase in demand translates into exaggerated increases in prices if there is only a limited

supply of food staples in the market. Under normal conditions of subsistence agriculture, only a small portion of the crop is destined for sale. When a crop fails, farmers retain proportionately more of their production for their own needs (or for speculation), greatly reducing the marketed surplus. For example, all other factors being equal, if 10 percent of a crop is sold as surplus, a 5 percent drop in yield will cause a 50 percent fall in the surplus sold, after subsistence needs are met. While supply contracts dramatically in this way, demand remains steady, for food demand among marginal populations is essentially inelastic. The consequence is that the price for staples increases disproportionately, often times tripling or quadrupling. In other words, scant supply in the situation of constant demand forces prices to rise higher more quickly than usual, so that the cost of food becomes significantly higher. Caught in this economic scissors, people must spend much more to obtain the same amount of food, which decapitalizes many rural households and puts ever more people at risk.

In this situation, families resort to a second set of coping strategies. They change their food consumption patterns by using more "famine foods" scavenged from the countryside. Women, children, or men in a family may reduce the amount of food they eat at each meal. And, the family may eliminate one or more meals from their usual consumption. This less adequate diet increases malnutrition, most noticeably among young children, and can in time increase the vulnerability of the population to outbreaks of diseases, such as measles.

It must be pointed out that these two strategies --the search for additional resources and the reduction in food consumption--can occur simultaneously. They are not discrete strategies wherein one tries first to increase resources and only later, when that proves insufficient, does one change one's food consumption patterns. Rather the search for additional resources can occur at the same time that certain food consumption patterns are changed or reduced. After all, the two general strategies are both designed to increase or stretch resources in order to meet food intake requirements.

2. Socio-economic and health indicators in early warning systems

Famine early warning systems typically use two levels or tiers of information--data on physical conditions and data on socio-economic and nutritional

factors. To interpret extraordinary conditions in either set of data requires both a normalized baseline and current information. The baseline information provides a standard for assessing the extent to which current conditions deviate from usual conditions. Significant progress is being made in the development of a physical baseline and in the collection of current information for certain physical indicators, such as rainfall and river levels, as well as crop production, particularly through the use of remote sensing. Similar progress would be possible for socio-economic and nutritional indicators, were sufficient resources made available. To date, most effort in this area has been devoted to the definition of current indicators; little work has been focussed on the development of systematic socio-economic baseline data for the determination of standardized norms.

The scenario or model of coping behavior, described above, underlies the set of socio-economic and nutrition indicators that can be used in famine early warning systems. That is, interest lies in producers' assets, food costs, and food consumption strategies. Field interviews constitute the fundamental research techniques for assessing these matters. Thus, villagers can typically be asked about their sources of additional income, if any, without inquiry into the extent of that income. (Sources of additional income include: full-time employment, livestock sales, external aid programs, sale of artisanry, and farm products such as charcoal and butter.) Key informants can be asked to assess the extent of seasonal migration in relation to past experience. (Such qualitative assessments are now necessarily coded into one of several general categories, such as "much greater," "somewhat greater," "about normal," and "less than usual" for that time of year.) Finally, trained enumerators may keep track of market prices, usually just the price of one kilogram of the staple grain and that of one kilogram of beef, but sometimes of a more elaborate basket of goods, including several staples, charcoal, and poultry and livestock. These items are essentially tracking the extent of resources in relation to market prices.

Further, dietary and nutritional queries can be used to verify and refine the extent of vulnerability determined from the socio-economic measures. The field techniques comprise both interviews and physical measurements, usually of small children. Major areas of inquiry include: the principle staple for the preceding day or week (particularly grain or tuber, milk, foraged

foods, or none, which can include no meal); and, the source of this staple (own harvest, purchase, gift or exchange, external donation, charity, foraging; and, in the case of milk, own livestock). More detailed questions can cover the average number of meals eaten on average per day, the proportion of famine foods in the family diet, and the portions of food allocated to each family member. Queries about family food reserves (on-farm storage) are sometimes included on such questionnaires, even though such inquiries are answered, at best, with evasion, forcing the enumerator to supply very unreliable personal estimates. Finally, some monitoring programs include a nutrition-status examination, either an upper arm measurement controlled by age and sex or, more commonly, a weight-height ratio, which is compared to a standardized norm in order to determine the extent of malnutrition among children under five years of age.

Together, these questions can provide sufficient information to determine the state of the agricultural and pastoral campaign, the source and probable extent of family resources (if any), the extent of migration in search of alternative income opportunities, and the balance of market prices. If all the indicators are favorable or normal, food consumption, nutrition and health should be normal. Conversely, if the socio-economic indicators are all below normal, the nutrition measures should verify the deterioration in the situation. Unfortunately, the ensemble of pertinent socio-economic and nutritional information is seldom collected, which necessitates incremental decisions and sometimes causes protracted discussion among donors and between the donors and governments. The need, therefore, is to resolve technical problems in data collection and to extend the range of pertinent data considered in famine early warning.

C. Considerations in Using Socio-Economic and Health Indicators in Early Warning Systems

Several points about the present-day use of socio-economic, health and nutrition indicators for famine early warning systems warrant mention. First, the collection and use of such data vary widely from country to country, but is everywhere quite insufficient. Second, the collection of information for systematic analysis of the regional situation within a country cannot be separated from the nature of the reporting system that exists in that country: the reporting system very much determines the information available for analysis of

famine alerts. Third, despite agreement about how people cope in general, there is little agreement about the actual sequencing of behaviors in a particular instance, largely because what people do depends upon their individual circumstances. Finally, the possibility of regional indicators that may have earlier predictive value has yet to be considered seriously. The first three of these concerns are taken up below; the fourth matter is discussed in the appended note (section E).

1. Extant early warning schemes

The range of famine warning systems in east and west Africa is nearly as vast as the continent is wide. At the minimum, government will have created a food security commission for the calculation of the national food balance sheet in order to project national food requirements. In addition, government may have implemented an administrative reporting system that periodically collects information on local conditions throughout the country. In the best existing systems, government, often with the assistance of a donor, has also established a famine early warning unit, attached to the food security commission, to verify local conditions. Each approach provides and uses different types of information with greatly different levels of reliability.

Even the most elemental warning system, a national food balance sheet, requires some information and a system to collect it. Food security commissions use basic accounting procedures that are usually done on a nationwide basis and that involve a number of estimates. At the least, one must have a notion of current food production, existing food stocks, and commercial imports on the one hand, and food consumption, food losses, and food exports on the other. Most of this information is available from the national statistics service (e.g., food imports and exports) or international standards can be assumed (e.g., per capita cereal consumption). Production estimates are more problematic because they require a delimitation of the acreage cultivated by crop and an assessment of yields. (Estimates of local food stocks are more difficult still; in fact, they are often zeroed out of the equation.) The ministry of agriculture is usually charged with providing this information, but where it cannot verify local production, recourse may be made to special teams of crop estimation experts, usually from the FAO. While their estimates can only be grossly approximate, they still provide some notion of probable national supply.

In brief, national food balance sheets represent a good first attempt to assess aggregate demand and supply in order to estimate overall food requirements. This approach requires only basic statistical information that can be provided by line ministries or estimated international standards. The trade-off, of course, is that very little is known about particular areas. There is little specificity in the calculations, no breakdowns into regional assessments, and no monitoring of actual local need. No less importantly, the necessary information is available only very late in the season, long after it might have been needed for a famine alert system.

To resolve such problems, some governments have established a local monitoring system within the food security commission. Periodic reporting over large areas imposes two related requirements: first, a staff that is positioned across the area; and, second, a limited data collection effort. The first requirement, to collect the same information at the same time in many places, requires a large, dispersed staff. For this reason, most governments implement such systems through their ministries. In operation, the head of the local village or district committee collects the pertinent information from representatives of the government services involved (e.g., climatological service, agricultural statistics service), records this information on a standardized questionnaire, and forwards the report to regional authorities, who review all the local reports for consistency before sending them on to the commission's monitoring unit in the capital. The commission meets periodically to consider its staff's reports on food availability in local areas throughout the country.

This strategy of using government personnel who are posted to field positions severely limits data collection for several reasons. Such monitoring is usually an adjunct to the staff's primary responsibilities. They may receive little or no training. And, they often have no facilities to go out and collect data. Consequently, monitoring can be carried out only for key variables (indicators), which must be accessible, reliable, and timely. Usual indicator information includes: precipitation, agricultural production, demographic movements, and, sometimes, cereal and livestock prices. While this limited information in principle should be reliable and complete, even it is, in fact, all too often inaccurate and very spotty. Because local representatives seldom receive follow-up training and rarely have the

facilities to canvass areas systematically, many queries are not answered each month and much of the data reported are essentially anecdotal. Despite the serious problems associated with administrative reporting systems, this approach does at least offer the possibility of greater timeliness in signalling difficulties and greater precision in delimiting needy areas.

Such problems have in a few instances led governments and donors to create mobile assessment teams. These teams of trained enumerators and medical technicians go to areas where there have been reports of probable food shortages. There, the team draws a sample of families from selected villages in the area. It queries this population using a standard questionnaire and sometimes carries out physical measurements of the young children. Collecting these data to verify local conditions requires finer-grained indicators and thus better trained teams. As has been discussed, the usual indicator questions include: harvest and pasture conditions, ways of obtaining food (sale of assets, extent of purchases, use of famine foods), number of meals per day, age and marital status of migrant laborers, and the extent of malnutrition among small children. (Two factors that are critical in the family food balance equation--remittances and family food stocks--are usually elided from questionnaires because such queries elicit unreliable answers at best.) Querying these matters requires skilled interviewers. And, since the areas that warrant closer investigation will change over time, the teams must be mobile.

These more detailed socio-economic and nutritional data can verify local conditions, thus justifying a decision to provide additional food stocks. In principle, the combination of systematic sampling with careful interviewing and measurement can provide a documented basis for estimating actual food needs of different segments of the population in those local areas surveyed. Nevertheless, for minor technical reasons, which are readily resolved, the data collected by these specialized teams have, as yet, seldom provided the basis for improved estimates of the actual food need of specific segments of the population. (See below, Section D.)

In summary, the type, amount, and accuracy of socio-economic and nutritional information used in food needs assessments range from naught in national food balance calculations through very little in administrative reporting systems to some in mobile assessment teams. In

addition, government and donors can use information gleaned from their own projects and from the PVOs working in the area. Though useful, this information provides only spotty geographic coverage, is usually non-comparable across areas, and may be unreliable. Thus, it should be clear that the present need is for standardization of field investigations and systematization of data collection. It should also be clear that the timeliness and accuracy of food-needs reports improves dramatically and directly with the extent to which socio- economic and nutritional data are collected and analyzed.

2. Correlation of socio-economic parameters with famine

The analysis of socio-economic and health indicators is exceedingly complex and subtle under the best of circumstances. (For that matter, so is the interpretation of satellite photographs.) Despite agreement about how people cope, there is little agreement about the sequencing of behaviors because what people do depends upon their individual circumstances.

There are several reasons for the analytic complexity of socio-economic and nutritional indicators. First, different occupational or production groups (e.g., farmers, herders, artisans), which are commonly associated with ethnic groups, work on somewhat different seasonal schedules. The hungry season or soudure differs slightly but importantly among these groups. For herders, the hungry season occurs in the months just before the rains; for farmers, the difficult period is several months later, just before the harvest; for fishermen, the time of scant food supplies can be later still, in the months before the floods receded. This is just enough variation to complicate field verification, which for logistical reasons is likely to be done once per season for a particular area. If the survey is timed to capture the depth of the agriculturalists' situation, both herders (whose situation is then improving) and fishermen (whose situation is then deteriorating) may appear better off relative to the farming population. In other words, standards must be established for each occupational group in accord with their seasonal calendar, if the analyst is to avoid false diagnoses. This is particularly important because the non-agricultural groups (e.g., herders, artisans) are more exposed to the vagaries of the cereals market.

Further, occupational groups have different options available, which complicates analysis. When drought occurs, herders will intensify the movement of their livestock, split their herds among relatives and friends, sell animals to buy cereal foods (which become a more important element in their diet as milk production declines), as well as sponsoring prayers for rain. Farmers, who are of course more sedentary, will send any animals off elsewhere with a young son or friend, raise funds through the sale of livestock or from petty trading activities, and share food stocks with relatives. Farmers without livestock are more exposed than those who also own animals. These farmers can depend only upon their agricultural production, which during years of poor harvests forces them more onto the cash labor market, just when daily wage rates may be falling. Thus, there is differentiation of options, which is to say different vulnerability, even within a production class. All of these differences must be carefully controlled in the analyses for famine early warning.

Even within a group or subgroup, patterns of coping behavior will vary with the specific situation of the family. For example, women may sell their jewelry early in a crisis in order to buy food if they expect their husbands to remain at home. But they may retain their jewelry as a last-resort option, if they fear their husbands may effectively abandon the families by seeking work elsewhere and not remitting wages home. In other words, an accepted indicator of distress such as asset sales cannot be used by itself to determine the severity of the crisis. Corroborating evidence must also be taken into account.

Differences of class, occupation, gender and age could be sorted out in time if the world were a closed system where local populations were in balance with their environment. Under those conditions, it could be presumed that each production group had fashioned coping mechanisms from experience and that these same mechanisms would be brought into play at about the same time in any subsequent disaster. This static regularity would enable the analyst to build a model of the sequence of events and behaviors. In fact, however, populations in marginal or vulnerable areas are constantly adapting their behavior to new conditions, as of course are people everywhere. Time-tested coping mechanisms may not exist in some areas, such as those recently settled by migrants. And, elsewhere, traditional patterns may be undergoing radical

change. It is much more difficult to model change in an open system, where future events and behaviors are changed because of experiences in the recent past. With famine, for example, many more people are impoverished after the crisis than before. A goodly number of these people can recover in time. But without any development assistance, there will still be more poor long after the famine than at the outset. If crisis strikes again too soon or if the numbers of impoverished remain too large, traditional forms of mutual aid may be overwhelmed more quickly than in the past, thus exacerbating future crises. (Technically such a downwardly spiralling of conditions is termed a negative amplifying system.) Such change does not render futile the attempt to model behavior and define indicators, but it does alert the analyst to the dangers of complacently relying on mechanical models of past experiences in order to predict future events and underscores the necessity for constantly updating the vulnerability analyses.

That general patterns of coping behavior translate into a myriad of specific behaviors because individuals react to events in terms of their own situation and experience underscores the necessity of implementing local systems for monitoring, verification, and warning. In other words, an early warning system must take a tiered approach wherein general trends, such as drought or civil unrest, signal a need for closer scrutiny of regional and community patterns, which in turn may indicate the need for finer-grained analyses among the more vulnerable groups in order to determine the existence and extent of probable need. This matter of levels of information is, again, inextricably bound up with another question, that of reporting systems.

D. FEWS Contributions to the Refinement and use of Socio-Economic and Nutrition Indicators in Famine Early Warning Systems

The contribution of the FEWS project to the refinement and use of socio-economic and nutrition indicators in famine early warning systems is best discussed in terms of an ideal for such monitoring in relation to the actual possibilities existing in the concerned countries at this time.

Ideally, socio-economic and nutritional monitoring for famine early warning would systematize data collection at the same time that it resolves significant difficulties in current monitoring systems. There are at least two

major problems that must be dealt with. First, much socio-economic and nutrition data collection is essentially haphazard. Project and PVO information is naturally opportunistic in that these data are available because of other work; geographic coverage is spotty and may well not include the areas of greatest vulnerability to famine. Field verification of food access does, of course, cover precisely the neediest areas. But these studies are done irregularly, according to need. Although all these sources contribute to famine early warning, they do not and cannot provide a systematic data base. Second, and no less importantly, the many different studies that are carried out for one reason or another are often done independently. That is, there is little or no coordination among the studies in the areas of inquiry nor any standardization of questionnaire items. The need, then, is to systematize these studies in such a way that baseline data bases can be compiled for communities across different ecological zones.

1. Standardization of methodology

Systematization of socio-economic and nutritional monitoring requires the definition of a standard sample of villages and respondents. The village sample must include different ecological and production zones in the vulnerable regions, so that a sample of villages along a transect that cuts across ecological zones would provide the necessary variation in production (and ethnic) groups for comparative analysis. In very large regions, transect samples of this sort could be taken every 150 or 200 kilometers. Every fifth village within a six kilometer distance of this transect could be included in the sample. Then, within the selected villages, the sample of respondents could be selected randomly by, for example, including every fifth household. (The actual number of villages and households selected would depend upon the demographics of the area and the complexity of the analyses that are contemplated.) Properly done, this approach would permit not only verification of food needs but also the quantification of that need, something that has yet to be accomplished systematically in any reporting system.

For each of these villages in the sample, highly focussed baseline studies would be done in order to develop standardized norms or estimates for each of the pertinent indicators (e.g., percentage of adult unmarried males outmigrating by month, percentage of chronically malnourished children also controlled by seasonality,

price of a kilogram of millet and of rice) and to provide context for comparative analysis. Compilation of these baseline monographs for vulnerability analysis is admittedly time-consuming because one must record for each occupational or production group the basic information on production, consumption, health, and nutrition, among other matters. Moreover, this information must be recorded over time in order to take seasonality into account and in order to eliminate year-to-year variations. In other words, the baseline data base must be built up over time. But--and it is important to underscore this point--establishing these baseline standards is mandatory because monitoring for anomalous patterns can only be done in relation to normal (even if unsatisfactory) conditions.

Subsequently, in each of these villages, a random sample of families would be selected for periodic interviewing. The questionnaires would cover all of the usual items in famine early warning systems. The use of the same sample of families over time would validate the baseline norms established earlier. It would permit diachronic analysis, as well as the introduction of innovative questions for testing. And, importantly, the information collected could readily be archived within the framework of a geographic information system, which in this view is the major utility of a GIS.

Such a system need not be expensive to implement. The major difficulties and expenses would be incurred at the outset in sample selection and enumerator training. Afterwards, the costs of the program would be much reduced inasmuch as the personnel are, in this scenario, already at the disposal of the concerned government agencies. The major problems would be the usual ones of logistic support and training follow-up. Once again, the FEWS project might undertake to support such an effort on an experimental basis.

2. Implementation

As has been mentioned, the possibility of implementing such a monitoring system will very much depend upon the present evolution of each country's national early warning system. At the one extreme, the national EWS may be limited to the calculation of a food balance sheet, which simply aims to define aggregate need. At the other extreme, the national EWS may be sufficiently elaborate that it entails regular monitoring of key indicators at the regional and local levels, with

field verification studies being undertaken when trend indicators signal the likelihood of significant difficulties among some populations in their access to food. Institutionally, the aim of FEWS is to strengthen existing agencies so that they are able to perform more advanced monitoring activities.

Where the EWS involves only the calculation of a food balance sheet, the FEWS project can undertake two major activities: to foment interest in more extensive monitoring systems and to standardize data collection to the extent possible. To foment interest, the project could support conferences for famine-prone states, such as have been held in the recent past under the aegis of regional organizations such as CILSS. Another opportunity is for national experts in countries where EWS is more advanced to visit agencies with less sophisticated programs in order to explain what is involved in field monitoring systems, how to institute such systems within government, and what difficulties are likely to be encountered in this endeavor.

At the same time, the FEWS representative would attempt to standardize data collection to the extent possible. This work would have two aspects: to ensure that particular studies included specific areas of interest for FEWS in their inquires, and to ensure that the particular questions were similarly phrased so that the information gathered would be comparable over areas. This seemingly simple task will prove exceedingly difficult to achieve in the event even though the standardization of methods, questionnaires, and analysis remains an acknowledged area of needed collaboration among EWS agencies. At present, agencies often devise their own methods and interview instruments, which gives rise to incomparability of results. The FEWS project can in this regard support the standardization of research instruments or at least the inclusion in all studies of a small set of key indicator questions that would facilitate extrapolation between studies.

In either case, enumerator training will be absolutely necessary. Experience demonstrates that similar methods can lead to very different conclusions, which imply diametrically opposed prescriptions for action. For example, in Mali,the height-weight ratio measures, which should provide reliable information, have been characterized by wide variation, over 100 percent in the proportion of severely malnourished children found <u>in the same village in the same month</u> by two different

organizations. This variation can only be due to improper sampling techniques, to imprecise weight and height measurements, or both. Training the staff of the different organizations at the same sessions would reduce, if not eliminate, this variation. Intensive follow-up in the field would also be required, in order to identify and correct problems in sampling, measurements, or analysis.

The FEWS representative would also continue the compilation of secondary data, which is a significant contribution when no government agency is charged with this task. He or she would also participate in field verification missions, with the aim of introducing methods and techniques that had been used successfully elsewhere. Indeed, the FEWS representative would generally continue to provide pertinent technical assistance on an informal basis to staff in private-sector and government agencies. Systematic assistance, however, is only possible where there already exists a formally instituted EWS unit within government.

In those countries where a national agency already coordinates a systematic monitoring activity, the opportunities for technical assistance lie in strengthening the data collection expertise of field staff. There are several areas that warrant attention at this time. An institutional or management analysis of the structure and operation of the local reporting system constitutes an important first step in understanding the types of problems that the field staff encounter in their everyday work. The standardization of research instruments and the training of field enumerators is, again, a major innovation that merits immediate attention. And, of course, training programs, with intensive follow-up work in the field, will be necessary in order to implement these revised research tools successfully. Finally, once the regular questionnaire program is underway, teaching seminars might be held for field staff on the practical aspects of carrying out baseline monographs. (If this activity proves too difficult for this staff, it might perhaps be undertaken by the mobile field teams instead.)

Each of these activities requires that experienced technical assistance be provided to the national agencies that are charged with the collection of local level data. The examples of such assistance are multiple: the definition of items (a kilo of a specified cut of beef) must be made more precise; the importance of excluding extraneous variation (which is to say, collecting data for

136

precisely the same commodity or behavior on the same day and in the same place) must be inculcated; and, the necessity of collecting the entire range of information, and why, must also be instilled. Also, where logistic difficulties impede data collection, analysis of the manner and costs of resolving those problems should be undertaken.

All of these endeavors need not--and indeed probably cannot--be implemented at once within a single program. Rather, certain endeavors might be tried within one program, and others within another program, depending upon the capabilities and interests of each organization. Successful approaches could in that case be extended later to other programs, in a gradual institutionalization of EWS methods and approaches throughout the region. But in each country that already has a field monitoring program, the emphasis would be clearly on the segments of that agency in the conduct of its mission.

Countries that have yet to implement local reporting systems may permit some experimentation in the nature and organization of local reporting systems. Certainly, those systems based on administrative reporting face many difficulties: staff often lack resources for independent assessment of local conditions; inquiries are limited to the most basic information; even so, the responses are at best spotty and often unreliable. Analysis in consequence is constrained to evaluative judgments on whether conditions, prices, and other factors are better than, the same as, or worse than a specified previous period. This type of analysis can flag a potential problem area, but it cannot facilitate an assessment of the extent of need or the segments of the population with the greatest need.

In view of these difficulties, alternative reporting systems should be attempted. Specifically, it might be worthwhile to attempt working through local village representatives who fill out a weekly questionnaire, and bring it in on bicycle once a week to a center for verification and compilation. Alternatively, someone might go out and review the questionnaires with the local informants. The advantage of this system is that local people are not as constrained in their answers as government personnel may be, and they are acutely aware of anomalous behaviors, a major advantage where baseline studies are not available. The disadvantages, of course, are those associated with informants who have low literacy skills or none at all. These, however, are not impossible handicaps.

Finally, those countries that have both administrative reporting systems and mobile verification teams offer the best opportunity for systematizing sampling procedures. Here it would be possible to draw a random sample of villages along transect lines, as described above. The mobile teams could collect baseline information in the sample villages. And, if the local reporting system were maintained, at least in the short run, it would be possible (and desirable) to cross-check the sample results with the administrative reports in order to assess the congruence between the data sets, as well as the costs of each system. Such a program would provide a more systematic basis for the design of famine early warning systems than has been the case to date.

In summary, the FEWS project can facilitate the research efforts necessary to refine the socio-economic monitoring systems at the same time that it strengthens national monitoring agencies. The activities that can be undertaken include: systematization of sampling procedures, refinement of research instruments, training of field workers, and streamlining of analyses. With appropriate evaluation procedures, the project will be able to assess which techniques and approaches work best under specified circumstances, and thus will be able to extend these at lesser cost to other interested agencies. Importantly, the work that would be initiated in any country would depend upon the type of monitoring system now in place. Food security commissions would be encouraged to collect local data; administrative reporting agencies could receive assistance in refining their questionnaires and analyses; sophisticated monitoring systems with mobile verification teams could be assisted in the implementation of systematic sampling procedures. In this way, the FEWS project will not only serve its major goal as an early warning system but also will serve to institutionalize this effort in national governments, who are ultimately responsible for the care of their people.

E. A Note on the Possibility of Regional Indicators for Famine Early Warning Systems

1. Rationale for a regional perspective

The focus on individual adjustments to food shortages is understandable, for it is people who make these adjustments and who, under unfavorable conditions, must curtail their food consumption. Nevertheless, it is important to recognize that supra-family, indeed,

supra-community, networks organize any region and that these networks are likely to be affected adversely by food shortages. It may even be that the collapse of these networks and institutions is an important (though unstudied) factor contributing to the onset of societal breakdown that characterizes many famines.

Few regional networks are in fact considered in the famine literature. The most important that has received attention is, of course, the traditional network of commodity exchanges between herders and farmers. Most early warning systems consider these exchanges in terms of the prices of cereals and small livestock in the marketplace. These are proxy variables for the important exchanges of milk for cereal that traditionally take place along kinship and fictive kin lines among herders and agriculturalists. The abrogation of these relationships, or a change in the traditional terms of trade, would represent a significant rupture of local coping mechanisms. These types of relationships are seldom included in early warning systems, more because no one has canvassed villagers about the number of such relationships and the traditional terms of trade than because the information is inaccessible.

The regional marketplace system (which it should be pointed out is distinct from the economists concept of an abstract "market") constitutes another network that warrants attention in famine warning systems. In the ideal economic model of fully integrated and perfectly functioning markets, no necessary connection exists between regional food shortage and famine because additional supplies can readily be brought into the affected area without major impact on prices. Yet, as Devereux and Hay (1987:66) note, "dramatic rises in local food prices (which reflect market fragmentation) are symptomatic of food shortages" and have been incorporated into early warning systems as crisis indicators. Although marketing systems in agrarian regions may not be as fully integrated as is specified in the economists' model, these systems are usually not so fragmented that local demand causes sustained, dramatic increases in food prices. In agrarian marketplace systems, lower-level (rural) marketplaces are supplied with imported staples and manufactures by traders from higher-level (urban) markets. Locally, shortfalls--and even complete lacks--of a staple or commodity may occur in any week. (Rural markets take place on a periodic schedule, usually once every seven days, sometimes once in five days.) Traders, however, will take good note of local supply conditions during that marketday and will respond accordingly for the next market. If, for whatever reason, be it lack of

transport or lack or supplies, traders do not replenish the market in the following weeks, the agrarian marketplace system is not performing one of its usual and basic functions. Local prices will skyrocket, to be sure. But even more importantly, at best, the regional marketplace system is "fragmenting" into smaller subsystems--the regional marketplace system is collapsing into smaller, more local subsystems, which is nothing less than regional disintegration.

2. Prospective methodology

This process has nowhere been studied, so it is possible only to suggest the indicants of such a regional collapse. Two characteristics of agrarian marketplaces are important in order to diagnose such indicants: first, new, more specialized goods are added to marketplace inventories in an orderly and systematic manner; second, marketplaces are highly seasonal. These two points--the systematic addition and depletion of types of goods from marketplaces, and the seasonality of marketplace offerings--together suggest an important famine early warning indicator at the regional level. If effective demand in a region is sufficient to support purveyors of specialized arrays of goods during the post-harvest period, any significant decrease in demand during those same months in subsequent years will be reflected in the disappearance of those arrays from the marketplaces of the region, just as now happens during the off-agricultural season. In other words, decreasing specialization of market arrays is a direct indicator of decreasing effective demand or purchasing power, which is a usual criterion for determining vulnerability. If the type and number of marketplace arrays declines drastically, one may be witnessing the collapse of the entire system.

Paradoxically, as demand declines and specialized goods disappear from market inventories, the number of vendors of small arrays of mixed merchandise and of fingerfoods may increase dramatically. The reason that the number of vendors burgeons as economic conditions deteriorate is simple: people turn to marketing opportunities in order to secure whatever little additional resources they can to buy food. Typically, people will set up little tables with a small variety of common store goods, such as cigarettes, matches, candles, soap, candies, batteries and the like. Others will resell a crate of oranges or apples by the piece or cook finger foods for street sale. A sudden increase in the number of such sellers often indicates deteriorating economic conditions, particularly in urban areas.

The collapse of effective demand in a region might also be monitored in another way. The disappearance of specialized goods that signal falling demand (that is, lower purchasing power) pertains mostly to imported manufactures. (Others, such as hand-woven cloth of superior quality are, to be sure, made locally.) Although poor and marginal populations may purchase very few of these goods, some items have found their way into even these households because the manufactures represent significant improvements over the cheaper, locally made crafts. Plastic pails and buckets, for example, are much preferred over ceramic water carrying jars because the manufactures are not only more durable but also much lighter for the woman or child to carry. Inquiries to the major wholesale distributors of such commodities can readily provide important information on the number and size of orders being received from provincial distributors. Significant variation in the orders received over time from the different regions would provide an important verification of the processes occurring in the regional marketplace systems.

Changes in marketplace inventories, increase in the numbers of vendors of certain arrays of goods, and wholesalers' shipments are a direct indicator of changes in purchasing power, not of impending famine. These are fairly broad-brush indicators: it is not always possible to tell which groups are most affected. Nevertheless, marketplace surveys are an important tool for regional analysis because each market services a number of outlying villages. They therefore provide a synoptic view of changes in each area. And, these factors may provide timely signals about the collapse of the regional marketing systems that are a major bulwark against famine due to their role in the distribution of foodstuffs and commodities. As such, they hold promise as early indicators of further difficulties, and might be included in the FEWS research program in one or more countries.

ANNEX E-3

THE FEWS INFORMATION SYSTEM

I. THE GEOGRAPHIC INFORMATION SYSTEM

A. Definition

An information system is a tool to gather, merge, analyze, archive, and network data; and to provide products for an intended purpose. The system is the analyst's tool to access large amounts of data and to transmit information to decision makers. Since FEWS user information needs require spatial analyses with results in map form, because understanding "where" is as important as understanding "what" and "how much", the best system is a geographic information system (GIS). Generically, a GIS is that type of system which references its data with geographic coordinates and has the capability of presenting information in map form. The GIS can be as simple as a map hanging on the wall or more complex taking advantage of computers for integrating and analyzing large amounts of data. FEWS includes many participants and locations, each with unique roles. the FEWS GIS must therefore be an integration of component subsystems, each handling the unique requirements of the user; but each separate component fitting into an integrated distributed system.

B. Components of the FEWS GIS

1. People

The GIS is a tool for the analyst. The analyst, in establishing an interface with decision makers, must first determine their information needs and how data are to be interpreted, locate the data and enter it into the data base according to set priorities and manipulate the data using all analysis tools available. Of most importance, the analyst must communicate results to decision-makers and assure that their potential uses and limitations are understood.

2. Data base

Three basic forms of data are incorporated into a GIS: map, attribute, and image data. Map data are points, lines, and polygons which spatially describe features on maps; e.e., boundaries of an administrative unit or location of a type of land use. Attribute data

are statistics or narrative describing the features on the map; i.e., population of a city or the name of a river. Image data are picture elements (pixels) which are in a two-dimensional array of numbers having spatial location and a numeric value for each pixel; i.e., remote sensing data of reflectance or a surface created of rainfall estimates interpolated between point weather stations.

Reliable results cannot be obtained from unreliable data. Therefore, the data base is the backbone of the GIS. The data base requires constant updating as new data become available. Where the basic data have been entered and are still valid in detail and information content, they will be accumulated as a historic archive.

FEWS relies on multisectoral data obtained from a variety of sources. The unique aspect of FEWS is the use of socio-economic in addition to physical resource data. FEWS data are principally secondary. This use of secondary data offers the advantage of concentration on data analysis but the disadvantage that significant data gaps can occur. Moreover, since a universally accepted famine process model in not available, FEWS has no definitive criteria for prioritizing data.

FEWS analyses use current monitoring data to compare with historic baseline data to reveal anomalous variations that could indicate populations at-risk. The monitoring data must be available in near-real time. Sources of the data are numerous, with most data being generated within the country, in addition to data from METEOSAT and NOAA satellites.

Baseline data are required for two purposes. The first is for historic reference to establish normal agricultural climatological and socio-economic conditions. The second is to establish a cartographic basis and to prepare stratifications for monitoring and reporting information. Base maps are used to geographically register data and provide locational information such as transportation networks and administrative boundaries. Basic resource information; such as general soil boundaries, climatic regions and agricultural areas, assist analysis by providing stratifications for statistical summaries and by understanding the resources' potentials and limitation when making interpretations of data such as satellite-derived greenness indices.

3. Hardware

A computerized GIS uses computers of various sizes and capacities depending on the application. The computers are off-the-shelf with only special requirements being display devices and the ability to store large amounts of data. In the last few years, microcomputer technologies have advanced and have been widely accepted for GIS applications. The hardware must be specified according to functional needs. This includes definitions of amounts of data storage, hardware requirements of the selected software, and types and sophistication of input, output, and processing.

Levels of staff training and hardware maintenance must be balanced with benefits. Often, networks of distributed systems are established where central facilities provide services to field installations. The FEWS design has incorporated this approach where the more complex needs are provided centrally to avoid equipment duplication and to free the field analyst's time for using the GIS rather than spending undue time in learning and maintaining complex systems.

4. Software

Software is how the analyst instructs the computer system. GIS software includes provisions for data entry and merger, data base management, analyses, and information formatting and output. Software specifications are based upon user need. Many public domain and proprietary software packages are available for the GIS. FEWS has been designed to make use of existing software and not to internally develop its own.

Differing approaches to data structures and system operations are inherent within software packages. This implies data will often not be directly compatible and transferable from one software system to another. The FEWS design has integrated different subsystems of software in advance to assure compatibility.

C. How the GIS Functions

1. Data entry

Map data are entered with a digitizing tablet, where a cursor of crosshair is used to trace points, lines, and polygons from a map, thereby capturing geographic coordinates into the computer. Tabular or descriptive attribute data are entered on a computer keyboard. Image data are georeferenced and are entered in electronic form.

2. Data registration and merger

The points, lines, and polygons have a geographic location which is portrayed on a map having a given projection and scale. Geographic locations is noted in the computer by cross-referencing the computer addresses to geographic coordinates. Since the data may originate from maps with differing scales and projections, the GIS must have software to change map projections and scales to register and merge different data layers. Attribute data are linked to the map data such that all attributes for a given feature are recorded. Note that a basic requirement for developing a GIS is that data must have a geographic location. Base cartographic maps must be available to establish geographic locations and ground positioning. FEWS has used the 1:1,000,000 or 1:2,000,000 Navigation charts (or derivatives) as the map base. This map series covers all geographic areas of interest.

3. Data storage

Various options are available for storing data. Hard disk storage is always on line to the computer allowing instant data access. Data may also be stored on computer compatible magnetic tapes, floppy disks, or laser disks, and when needed, they must be entered into the computer. A balance of hardware costs and analyst time are considered when designing the data storage. The system design must consider the maximum amount of data storage necessary for any single analysis. The small computer typically used in the field will not be capable of conducting analyses which require extremely large amounts of data. The US-based system will conduct these analyses and provide the results to the field as a support service.

4. Data base management

Large volumes of data in many different files are maintained and must be available for analysis. A well-documented data base efficiently managed allows the data to be located and transferred to different users without loss of descriptive information on data availabilities, sources, and information contents.

5. Data analysis

Standard spread sheet and statistical analysis are the approaches familiar to most analysts. These analysis techniques are used, but the data are managed in map form. In addition, spatial analysis techniques permit the analyst to evaluate data combinations from one or more map data sources. An example would be the question: where are there areas identified as vulnerable that also currently have poor crop conditions. The two maps (vulnerability and crop condition) must be overlayed and their intersections evaluated to determine the location of two concurrent events. Since the FEWS model is a convergence of evidence approach, this simultaneous observation of a number of map layers of complimenting information is a major advantage of the GIS. The GIS provides information regarding distance, extent, and proximity; e.g. where are the at-risk populations within a specific distance from a feeding center.

6. Data output

Data output devices cover a continuum of sophistication. Map or statistical information can be output on the computer screen, hardcopy line printer reports, maps plotted on simple plotters in color or black and white, color or black and white line printer images, or sophisticated true map quality, scaled products from flat-bed line plotters, raster ink-jet plotters, or laser beam film recorders. Output from any one or a combination of these devices will be required for FEWS. The output product is the tool for communication of information to the decision maker.

D. Steps in Establishing an Information System

1. Identify user information needs

The system design must be user driven. The information needed in terms of types, frequency, format, and accuracy must be defined to design a system which matches capability with user anticipation.

2. Implementation policies

Where will the system be located; how will multiple users have access; who will support recurring costs; who has priority; who defines operating procedures; who will provide data; what are the priorities of data base development; and a variety other questions need to be answered to assure implementation of a cost-effective, sustainable GIS.

3. Interpretation framework

Models or algorithms to analyze data into user information must be defined. These interpretation models determine data characteristics such as map scale, data types, and data accuracy, which are necessary to derive required information from the data. The interpretation framework for FEWS currently relies upon convergence of evidence, trend analysis, and map analyses approaches.

4. Data classification framework

Data are classified into themes, i.e., vegetation types and population age classes. In order to derive the required information using the interpretation model, the data must have a certain information content. For example, it the user needs to know the sex ratio of specific age groups for his or her analysis and the raw data are entered without regard to age group, the data will not support the analysis. Since FEWS is realistically limited to available data, the dictates of a specific classification framework can only be prompted and encouraged and not specified within data collection programs.

5. Hardware/software system design

The hardware and software are specified to satisfy requirements as outlined in steps one through four. Thus, expectations and needs are matched to capabilities. Since precise definitions are not available for the FEWS GIS, the system has been designed with an initial minimal level of field system but with services provided from a sophisticated system at a USG facility as-well-as intermediate GIS capability with the U.S. base of the contractor. THe field system capabilities will be added as the system matures and additional user requirements are defined.

E. GIS as Appropriate Technology for FEWS

1. Geographic problem

FEWS information requires that vulnerability and at-risk conditions of the population be assessed. Information must be in a geographic context. This information serves the temporal requirements of early warning from the earliest indications to the ultimate decision, if required, providing relief.

2. Analysis procedures

The convergence of evidence approach evaluates multiple indicators, with each adding evidence and reinforcement to the interpretation. In addition, multiple observations of diverse phenomena at individual points reinforces an assessment and reduces the artifactual possibilities of single observations of single phenomena. Convergence of time, where sequential responses reinforce the interpretation, requires continual comparisons of new data with the previous. Other procedures used in FEWS analysis include trend analysis to monitor changes with time and map analysis to determine proximities, spatial correlations, and distances.

Standard statistical analyses of tabular data are conducted using spread sheets and statistical packages. However, to understand the full impact of the results, the information must be viewed on a map to know where the problem is, how big of area is affected, etc.

a. Synoptic assessments and targeting

Weather station data from the Global Telecommunications System (GTS) of WMO (as augmented by host country Departments of Meteorology) and satellite cloud and greenness observations are sources of synoptic data that are consistent across most countries. Collectively, they provide the basis for a broad overview of crop growing conditions or vegetation assessment, which can be used to identify regions having apparent problems and to target further detailed surveillance. Other data provided by regional centers are also reasonably available as are some from local and national centers. The latter can serve as the "next layer" to be used in expanding and verifying the remote sensing synoptic data.

b. Vulnerability analysis

A vulnerability assessment should be conducted each year prior to the cropping season to determine the populations which would be most affected by low crop production or some other factor. The assessment will serve as early warning and identify targets for more focussed monitoring.

3. Data base management

Many of the data are in map or image form with two or more different themes of data normally necessary for any given analysis. Statistical summaries or field anecdotal information which is referenced to a geographic location also must be accommodated. The data are derived from many sources which normally have a variety of map scales, map projections, and geographic referencing systems. These data must be merged and geographically registered before analysis. The more complex information system in the US will be used for this complex function.

The cataloging of data by geographic reference is an advantage to the user. The user can query the system to determine all data available for a given geographic bounds. This offers efficiency in analyst's time while using the data base.

4. Information communication to decision makers

Communication of information to the decision-maker is readily accomplished using maps. The map provides a means of graphic information transfer which simplifies explanation and enhances understanding of the location and severity of any problem.

II. DATA NETWORKING

A. General discussion

The GIS provides an efficient data archiving and retrieval system. Once data are located, screened, and entered into the GIS, they are potentially available to multiple users in a form suitable for a variety of analyses. Many projects and programs require analysis of the same basic data (in some cases, the only data).

Resources required for data collection are extremely limited. As expanded use of data occur through data networking and sharing, the costs of data collection can be amortized over a variety of projects and sponsors. Therefore, retaining and organizing data for networking will result in more data being available at a lower unit costs to all participating users.

B. Field data networks

FEWS relies upon secondary data from a variety of host country, regional, donor, and PVO/NGO organizations. Therefore, data networking is critical to the success of FEWS. FEWS will depend upon the interpersonal skills of the FFR to establish networks with data sources to complement the already available to the AID Missions.

The GIS and satellite data and analyses which will be provided by the project to the FFR can be passed on to the host country and others enabling the FFR to become an active contributor to the data collection agencies enhancing the collective monitoring effort. Where host countries have established an early warning agency, networks would normally be in place. FEWS may be able to assist these efforts by helping establish an information system to structure and use the data.

C. Data networking by donors and international agencies

Donors currently share results of assessments through summary reports and communications. When a question arises on the use and validity of information, the data from which the conclusions were drawn are not commonly available on a timely basis. This often creates multiplicity and redundancy and contradiction in donor efforts. As efficiency is gained using a GIS system where the actual data and not just the assessment results can be shared, each analyst can conduct his own assessment with his own procedures. The opportunity is lost if the original data are not available. The tendency is to recollect the data.

NOTE: Most data sharing, especially when the data analysis must be conducted quickly as in an early warning system, would occur through electronic transmission. Efficient, modern telecommunications are vital to donor coordination and FEWS effectiveness. The International Communications Center in Geneva is an example of bulletin-board-type networks where results are shared.

Current communication links to developing countries are severely limited. However, a variety of projects are being implemented and are planned which will improve the telecommunications links. An example of an existing system is the Global Telecommunications System (GTS) of WMO which transmits weather data within the country and ultimately throughout the world. This capability is currently in operation (at a limited level of efficiency) and is being continually upgraded as resources become available. Networking donor support is currently being provided by the World Bank.

D. Data networking with development projects

FEWS analyses produce information useful to development planning and programs. The vulnerability assessment targets those marginal areas where small changes in stimulus result in often disastrous results. These areas are also targets for development projects. They are also areas which are often most susceptible to environmental degradation.

Data needed for the FEWS interpretations are the same data useful for surveying resource assets and monitoring resource changes. The GIS data base could serve to identify development priorities and provide a method to compare alternative plans. Development projects, at the onset of FEWS, will be data providers throughout the various sectors. At later stages, development of host country capacity to maintain an early warning system gradually reduce the level of effort required of the US to maintain an effective FEWS.

ANNEX F

Project Data Processing Equipment List

ANNEX F . EQUIPMENT AND SOFTWARE PURCHASES
(models or brand names listed for procurement of equivalent and compatible capabilities-listing is not an endorsement of product)

	Total Project Needs	Number to Procure	Number Available
A. FFR/MISSION CONFIGURATION (6 COUNTRIES) :			
PORTABLE/LAP-TOP			
* Zenith 183 10 M Hard Disk min. 640 K memory min. 1:720 K, 3.5" flpy 1200 baud modem	6	4	2
* power pack + case	6	5	1
* inter-PC cable + transfer software	6	6	0
* Citizen MSP-20 prntr	6	0	6
* LOTUS 123 Ver. 2.01	6	6	0
* DBASE III PLUS	6	6	0
* PROCOMM 2.4	6	6	0
* WORD PERFECT v. 5.0	6	6	0
* NORTON UTILITIES	6	6	0
* NORTON COMMANDER	6	6	0

OFFICE LEVEL A FOR 6 FFR/MISSIONS AND ONE ETHIOPIA COUNTRY ANALYST IN WASHINGTON OFFICE

*	80286 system 1 M memory 1.2 M flpy disk MSDOS 3.2 or later	7	2	5
*	EGA board + monitor	7	1	6
*	80 M Hard disk min.	7	7	0
*	NEC Penwriter P5XL	7	1	6
*	1200 baud modem	7	3	4
*	Microsoft Mouse	7	1	6
*	ATLAS GRAPHICS	7	1	6
*	LOTUS 123 Ver. 2.01	7	0	7
*	DBASE III PLUS	7	0	7
*	PROCOMM 2.4	7	7	0
*	WORD PERFECT v. 5.0	7	7	0
*	SPSS\PC PLUS	7	2	5
*	NORTON UTILITIES	7	7	0
*	NORTON COMMANDER	7	7	0
*	SHOW PARTNER	7	7	0
*	IDA	7	*	*
*	PIZZAZZ	7	7	0

B. HOST COUNTRY CONFIGURATIONS

OFFICE LEVEL B FOR 6 HOST COUNTRY INSTALLATIONS
(Not immediate procurement)

*	80286 system 1 M memory 1.2 M flpy disk MSDOS 3.2 or later	6	6	0
*	EGA board + monitor	6	2	4
*	80 M Hard disk min.	6	6	0
*	NEC Penwriter P5XL	6	6	0
*	1200 baud modem	6	6	0
*	Microsoft Mouse	6	5	1
*	ATLAS GRAPHICS	6	6	0
*	LOTUS 123 Ver. 2.01	6	5	1
*	DBASE III PLUS	6	5	1
*	PROCOMM 2.4	6	6	0
*	WORD PERFECT v. 5.0	6	6	0
*	SPSS\PC PLUS	6	6	0
*	NORTON UTILITIES	6	5	1
*	NORTON COMMANDER	6	5	1
*	SHOW PARTNER	6	6	0
*	IDA	6	*	*
*	PIZZAZZ	6	6	0

WASHINGTON OFFICE CONFIGURATION (continued)

WASHINGTON OFFICE LEVEL B GEOGRAPHIC INFORMTION SYSTEM

*	80386 system 1 M memory 1.2 M flpy disk MSDOS 3.2 or later	1	0	1
*	300 M Hard disk min.	1	1	0
*	80387-16 coprocessor	1	1	0
*	1 M memory add-on	1	1	0
*	Microsoft Mouse	1	1	0
*	GTCO 36x48 Digitizer	1	0	1
*	HP 24x36 plotter	1	0	1
*	1200 baud modem	1	1	0
*	Terrapak GIS	1	0	1
*	Definicon coproc. for TERRAPAK	1	0	1
*	Definicon FORTRAN and PASCAL	1	0	1
*	ARC/INFO starter kit	1	0	1
	P/C INFO module	1	0	1
	Overlay module	1	0	1
	ARCEDIT Module	1	0	1
	ARCPLOT Module	1	0	1
*	ATLAS GRAPHICS	1	1	0
*	LOTUS 123 Ver. 2.01	1	1	0
*	DBASE III PLUS	1	1	0
*	PROCOMM 2.4	1	1	0
*	WORD PERFECT v. 5.0	1	1	0
*	NORTON UTILITIES	1	1	0
*	NORTON COMMANDER	1	1	0
*	SHOW PARTNER	1	0	1

WASHINGTON OFFICE CONFIGURATION (continued)

WAHSINGTON OFFICE LEVEL C IMAGE PROCESSING/ANALYSIS

*	80386 system 1 M memory 1.2 M flpy disk MSDOS 3.2 or later	1	0	1
*	300 M Hard disk min.	1	1	0
*	80387-16 coproc.	1	1	0
*	1 M memory add-on	1	1	0
*	1200 baud modem	1	1	0
*	Microsoft Mouse	1	1	0
*	Autoload 1600 BPI 9 track tape drive	1	0	1
*	Storage Dimension laser Disk with 800 M capacity min.	1	0	1
*	No. 9 video board	1	0	1
*	Analog RGB display	1	0	1
*	Terramar Software	1	0	1
*	LOTUS 123 Ver. 2.01	1	1	0
*	DBASE III PLUS	1	1	0
*	PROCOMM 2.4	1	1	0
*	WORD PERFECT v. 5.0	1	1	0
*	NORTON UTILITIES	1	1	0
*	NORTON COMMANDER	1	1	0
*	SHOW PARTNER	1	1	0
*	IDA	1	*	*

Note: * denotes public domain available at no cost.

C. WASHINGTON OFFICE CONFIGURATIONS (1 CONTRACTOR IN US) :

PORTABLE/LAP-TOP

*	Zenith 183 20 M Hard Disk min. 640 K memory min. 1:720 K, 3.5" flpy MSDOS 3.2 or later	3	3	0
*	1200 baud modem	3	3	0
*	power pack and case	3	3	0
*	inter-PC cable + transfer software	3	3	0
*	Citizen MSP-20 prntr	3	2	1
*	LOTUS 123 Ver. 2.01	3	3	0
*	DBASE III PLUS	3	3	0
*	PROCOMM 2.4	3	3	0
*	WORD PERFECT v. 5.0	3	3	0
*	SPSS\PC PLUS	3	3	0
*	NORTON UTILITIES	3	3	0
*	NORTON COMMANDER	3	3	0
*	SHOW PARTNER	3	3	0

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*	80386 system 1 M memory 1.2 M flpy disk MSDOS 3.2 or later	1	0	1
*	80 M Hard disk min.	1	1	0
*	OASYS Laserpro prntr	1	0	1
*	1200 baud modem	1	1	0
*	Microsoft Mouse	1	1	0
*	ATLAS GRAPHICS	1	1	0
*	VENTURA Publisher	1	0	1
*	LOTUS 123 Ver. 2.01	1	1	0
*	PROCOMM 2.4	1	1	0
*	WORD PERFECT v. 5.0	1	1	0
*	NORTON UTILITIES	1	1	0
*	NORTON COMMANDER	1	1	0
*	Print Q	1	0	1
*	Pizzaz	1	0	1
*	Mirror	1	0	1
*	Pro Design	1	0	1

D. PROCUREMENT SUMMARY COST ESTIMATES

ITEM		TOTAL NEEDS	NEW PURCHASES
EQUIPMENT + SOFTWARE TOTALS		282500	141300
SELECTIVE FIELD AUGMENTATIONS			35000
OPERATING CONTINGENCY FUND			21700
MAINTAINANCE	FIELD		21000
	HOME		6000
SUPPLIES	FIELD		10500
	HOME		15000
TOTAL ESTIMATED NEW PURCHASES			$250000

ANNEX G

Environmental Categoric Exclusion

Annex G.

INITIAL ENVIRONMENTAL EXAMINATION
OR
CATEGORICAL EXCLUSION

Project Country: Regional 698-0466

Project Title: Famine Early Warning System

Funding: $9,000,000 (LOP) FY 89-91

IIE Prepared by: AFR/TR, Jonathan Olsson

Environmental Action Recommended:

Positive Determination _____

Negative Determination _____

Categorical Exclusion:

The Famine Early Warning System (FEWS) project meets the criteria for Categorical Exclusion in accordance with Section 216.2(c)(2) (i) (iii) (v) (vii) and (xiv).

FEWS activities include collecting, analyzing data (some of which is nutrition), and the technical assistance and training to help African countries with their own early warning/planning activities.

APPROVED X

DISAPPROVED _____

DATE 7/20/88

Concurrence:
Bureau Environmental Officer
Bessie L. Boyd , AFR/TR/ANR

Clearance: GC/AFR:AAdams _____ Date July 22, 1988

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160