
64 10 102

GHANA

MANAGED INPUTS & DEL OF AGR-SERVICES

PY80 TO PY84

PROJECT SUMMARY DESCRIPTION

Grant and loan are provided to the Government of Ghana (GOG) to increase agricultural production of small farmers (SF) in the Brong-Ahafo Region (BAR). The project, a follow-on of project 641006700, consists of three subprojects. Subproject one will establish SF input and credit delivery systems. A Project Executive Committee will implement the project through regional and district coordinators.

Grant funds will be used to create permanent headquarters for the Ghana Seed Company (GSC); to provide technical assistance (TA) to upgrade GSC's operational capacity; and to install processing, drying, and condition storage equipment in three GSC regional plants for delivery to BAR small farmers.

Headquarters and four regional centers will be set up for the Ghana Seed Inspection Service to test, inspect, and certify seed. To expand SF credit, the Agricultural Development Bank and the Bank of Ghana will use grant funds to set up 17 new credit facilities which, along with six existing facilities, will provide credit for 43,000 SF's. Production loans will be disbursed for activities such as land clearing, planting and production inputs, and crop maintenance harvesting; mid-term loans will be available for capital investments such as purchasing equipment and storage facilities. Village-level group lending will be emphasized. Credit staff will monitor the use of production inputs. TA in loan and servicing procedures will be provided to 65 bank personnel.

To support the seed multiplication component, especially for the BAR, loan funds will finance seed processing, drying and conditioned storage equipment for one processing center; seed laboratory equipment for two centers; and electrical switch gear and insulation material for three processing centers. GOG and GSC will finance all other seed center construction and equipment as well as land acquisition. Loan funds will also finance SF inputs such as animal-powered equipment; small shop hand tools; production, storage, and marketing equipment; equipment and raw production materials for small fishermen; vegetable seeds; and AID-approved agricultural chemicals.

DESCRIPTORS

INSTIT BUILDING	SMALL FARMERS	AGR PRODUCTION	AGR CREDIT
INDIGENOUS TRNG	AGR DELIV SYS	AGR DEVEL BANK	AGR INPUTS
AGR MARKETING	AGRO CHEMICALS	CROP QUALITY	STORAGE FACIL
SEED	SEED CERTIFIC	SEED DISTRIBUTH	SEED STORAGE
CREDIT INSTIT	CRED MGMT TNG	AGR PROD CREDIT	CREDIT MEDIUM
FISH INDUSTRY			

SUB-PROJECT NUMBER: 01

BATCH NUMBER: 43

*6410102

GHANA

MANAGED INPUTS & DEL OF AGRY-SERVICES II

PY80 TO PY84

PROJECT SUMMARY DESCRIPTION

Grant and loan are provided to the Government of Ghana (GOG) to increase small farmer (SF) production in the Brong-Ahafo Region (BAR). The project, a follow-on of project 6410067, consists of three subprojects. In subproject two, grant funds will be used to provide technical assistance, training, and other inputs to improve the organization and outreach capability of the GOG's home extension (HEU) and farm extension (FES) services and to upgrade GOG SF research. A Project Executive Committee will implement the project through regional and district coordinators.

FES and HEU will be assisted in such areas as activity coordination; adapting research findings; demonstrating the use of production inputs; and establishing communication between the implementing institutions and SF's. Fertilizer (25 tons) and other inputs needed for trials will be provided through the delivery system to relieve extensionists of this responsibility. Field staff will be increased from 153 to 269 members serving 291 families each and will be given improved transportation facilities needed for farmer training. At least 300 management production practices/inputs trials will be conducted annually and 80% of the BAR families will be reached, mostly through group sessions. HEU will establish five demonstration centers for laborers and home managers, especially women. HEU programs will stress improved production/consumption of nutritious foods and improved storage, processing, and preservation techniques; as well as improved techniques for managing farm and household resources. An applied, multi-interdisciplinary SF research capability will be created by: (1) establishing a 10-acre research station in the BAR to test new varieties and farm management and production practices; (2) developing a land management system to increase and maintain soil fertility, extend cultivation periods, and reduce slash and burn cultivation; (3) developing management/production packages; (4) placing research plots in farmers' fields; and (5) training, either locally or in third countries, a cadre of Ghanaians to assume responsibility for the entire research program.

DESCRIPTORS

INSTIT BUILDING	SMALL FARMERS	FERTILIZER	AGR PRODUCTION
AGR INFO SRVC	AGR MGMT	AGR EXPER STATN	VARIETAL RES
AGR TECHNOLOGY	AGR RESEARCH	AGR PROD PKG	WOMEN DEVEL
DEMO FARM	INDIGENOUS TRNG	AGR EXTENSION	AGR INPUTS
AGR MARKETING	CROP QUALITY	STORAGE FACIL	PARTIC TRAINING
FARMER TRAINING	FOOD PRESERV	FOOD PROCESSING	FOOD STORAGE
SOIL MGMT	SOIL RESEARCH		

SUB-PROJECT NUMBER: 02

BATCH NUMBER: 43

 *64 10 102 GHANA
 * MANAGED INPUTS & DEL. OF AGRI-SERVICESII
 * PY80 TO PY84

PROJECT SUMMARY DESCRIPTION

Grant and loan are provided to the Government of Ghana (GOG) to increase small farmer (SP) production in the Brong-Ahafo Region (BAR). The project, a follow-on of project 6410067, consists of three subprojects. Subproject three will use grant funds to upgrade the Project Executive Committee (MPEC) in Accra, Ghana, to establish a fertilizer development and distribution system, and to test three interventions to improve Ghana's crop marketing system. The Project Executive Committee will implement the project through regional and district coordinators.

A MPEC in the BAR will be established as a subcommittee of the central MPEC and will be responsible for planning, implementing, and monitoring project activities; upgrading the project's role and relationship with the GOG through the sub-district level; and assuring that inputs and services reach farmers in a regular and timely manner. A field committee will also be established to implement field level activities.

Under the marketing component, the following interventions will be tested in the Atebub District of the BAR in order to improve marketing procedures for SP's: (1) Loans will be made at prevailing commercial rates to at least 90 traders to test the impact that adequate capital will have on the performance of farm gate marketing services, particularly regarding the volume of private trade. (2) A mechanic service center will be established as a limited liability company of the Agricultural Development Bank to maintain and repair market-service vehicles. (3) District market place facilities will be improved for effective bulking and marketing of farm produce. A data collection system will be established to evaluate the interventions and assess their prospects for replication. Finally, technical assistance will be provided in designing and establishing the procurement and distribution of bagged, blended fertilizer and to establish a fertilizer delivery system. These activities will make fertilizer more accessible to SP's and will reduce its per unit cost. The previous project's objective of establishing a local fertilizer company has been dropped.

DESCRIPTORS

INSTIT BUILDING	SMALL FARMERS	FERTILIZER	FERTIL DISTRIB
AGR PRODUCTION	MKTG RES	MKTG FACIL	AGR PROD CREDIT
AGR MARKETING	VEHICLE REPAIR	AGR PLAN UNIT	IMPACT INFO SYS

SUB-PROJECT NUMBER: 03

BATCH NUMBER: 43

PD-1116-412

64101020/4201

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT DATA SHEET		1. TRANSACTION CODE <input type="checkbox"/> A = Add <input type="checkbox"/> C = Change <input type="checkbox"/> D = Delete	Amendment Number _____	DOCUMENT CODE 3
2. COUNTRY/ENTITY GHANA		3. PROJECT NUMBER 641-0102		
4. BUREAU/OFFICE AFR		5. PROJECT TITLE (maximum 40 characters) Mgd. Inputs & Del. of Agric. Svcs--II		
6. PROJECT ASSISTANCE COMPLETION DATE (PACD) MM DD YY 09 30 85		7. ESTIMATED DATE OF OBLIGATION (Under "B" below, enter 1, 2, 3, or 4) A. Initial FY 80 B. Quarter 4 C. Final FY 84		

8. COSTS (\$000 OR EQUIVALENT \$1 = C2.72)

A. FUNDING SOURCE	FIRST FY 80			LIFE OF PROJECT (\$ 000s)		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	18,770	180	18,950	30,300	900	31,200
(Grant)	(3,770)	(180)	(3,950)	(15,300)	(900)	(16,200)
(Loan)	(15,000)	(-)	(15,000)	(15,000)	(-)	(15,000)
Other U.S.						
Host Country	-	2,600	2,600	-	40,000	40,000
Other Donor(s)						
TOTALS	18,770	2,780	21,550	30,300	40,900	71,200

9. SCHEDULE OF AID FUNDING (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) FN	210	230	010	-	-	16,200	15,000	16,200	15,000
(2)									
(3)									
(4)									
TOTALS						16,200	15,000	16,200	15,000

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)	11. SECONDARY PURPOSE CODE
070 040 020 120 140 060	133
12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)	
A. Code BSW BRW	
B. Amount 50,000 22,200	

13. PROJECT PURPOSE (maximum 480 characters)

To deliver production and marketing inputs and services to small farmers concentrated in the Brong-Ahafo Region, while continuing to strengthen those agriculture service institutions responsible for project coordination.

14. SCHEDULED EVALUATIONS	15. SOURCE/ORIGIN OF GOODS AND SERVICES
Interim MM YY MM YY Final MM YY 04 83 10 85	000 941 Local Other (Specify) 935

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

N/A -- This is a new project paper.

17. APPROVED BY	Signature <i>John A. Cohen</i>	18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION MM DD YY 01 10 81
	Title Mission Director, USAID/Ghana	
	Date Signed MM DD YY 06 16 80	

MANAGED INPUTS AND DELIVERY OF AGRICULTURAL SERVICES
(MIDAS - PHASE II)

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MIDAS PHASE II

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- A. 611(e) Certification
- B. GOG Request for Assistance
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III. DESCRIPTIVE AND TECHNICAL EXHIBITS

- A. Description of the Brong-Ahafo Region
- B. Description of Small Farmers in the Brong-Ahafo Region
- C. Phase II Service Delivery in the Brong-Ahafo Region
- D. Phase II Technical Feasibility
- E. Technical Assistance
- F. Relationship to other projects in the Brong-Ahafo Region
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- H. Evaluation Criteria for Measuring EOPS
- I. Implementing Organizations/Institutions
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- K. Technical/Economic Feasibility Analysis of the Marketing Component
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IV. ECONOMIC AND EXHIBITS

- A. Macro-Economic Analysis
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V. IMPLEMENTING AND PLANNING EXHIBITS

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VI. FINANCIAL EXHIBITS

- A. Summary of AID Inputs by Component for Loan and Grant
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VII. INITIAL ENVIRONMENTAL EXAMINATION

NOTE: The following annexes are not included in this schedule. They are available in AID/W (AFR/DR) and at the USAID Mission for Review.

- DETAILED SOCIAL SOUNDNESS ANALYSIS
- ADMINISTRATIVE FEASIBILITY ANALYSIS

ACRONYMS

ADB	Agricultural Development Bank
AG	Attorney General's Office
AID	Agency for International Development (U.S.)
BIRD	Bureau of Integrated Rural Development, UST
BOG	Bank of Ghana
CRI	Crops Research Institute
CSIR	Council for Scientific and Industrial Research
DAP	Development Assistance Plan of USAID/G
DERPS	Division of Economic Research and Planning Service, MOA
FLO	Farm Loan Office, ADB
GDB	Grain Development Board
GFC	Ghana Fertilizer Company
GOG	Government of Ghana
GSC	Ghana Seed Company
GSIS	Ghana Seed Inspection Service
IITA	International Institute for Tropical Agriculture, Ibadan, Nigeria
MFEP	Ministry of Finance and Economic Planning
MIDAS II	Managed Inputs and Delivery of Agricultural Services, Phase II
MOA	Ministry of Agriculture
MPAC	MIDAS Project Advisory Committee
MPEC	MIDAS Project Executive Committee
PIO/C	Project Implementation Order/Commodities
PIO/T	Project Implementation Order/Technical
PP	Project Paper
R&DA-B/A	Regional and District Administration, Brong-Ahafo Region
SMC	Supreme Military Council
SMU	Seed Multiplication Unit, MOA
SRI	Soils Research Institute, CSIR
TVA	Tennessee Valley Authority
USAID/G	U.S. Agency for International Development Mission to Ghana
UST	University of Science and Technology, Kumasi

PART I - SUMMARY AND RECOMMENDATIONS

1.1 (See Face Sheet)

1.2 Recommendations

That you approve a Grant/Loan package to be provided to the Government of Ghana in an amount not to exceed \$31,200,000 (Loan \$15,000,000 and Grant \$16,200,000), and authorize FY 80 grant funding in the amount of \$3,950,000 and loan funding in the amount of \$15,000,000 at most favorable terms.

1.3 Summary

The project is an integrated rural development effort designed to deliver in coordinated fashion an array of inputs and services designed to substantially increase production and incomes of 62,500 of the 78,300 small farm families in the Brong-Ahafo Region of Ghana.

1.31 The Project Target

To effectively reach by year five 55 percent (43,000) of the small farm families in the Brong-Ahafo Region of Ghana with production inputs and credit and other services and an additional 25 percent (19,500) small farm families with production inputs and services other than credit.

1.32 Borrower/Grantee and Executive Agencies

The borrower/grantee will be the Government of Ghana represented by the Ministry of Finance and Economic Planning. The primary executing agency will be the MIDAS Project Executive Committee which is comprised of authorized senior rank representatives of the Bank of Ghana; Ministry of Agriculture; Ministry of Finance and Economic Planning; Agricultural Development Bank; Ghana Fertilizer Company; Ghana Seed Company; Attorney-General's Office, USAID is a co-opted member. The MIDAS Project Executive Committee was established by Executive Decree, SMC 165, 1978, which is presently in effect. The implementing institutions include those represented by the project executive committee and other agencies.

1.33 Project Goal

To increase production and incomes and improve the welfare of small farm families in the Brong-Ahafo Region.

1.34 Project Purpose

The purpose of Phase II is to (1) establish the regional distribution system and deliver production inputs and marketing, credit and extension services to 80 percent of the small farmer families in the Brong-Ahafo Region; and (2) continue to strengthen the capacity of the national institutions responsible for delivering inputs and services and overall project

implementation. The project purpose will be achieved through six technical sub-project components: (1) Seed Multiplication and Distribution; (2) Small Farms Credit Expansion; (3) Extension/Demonstration; (4) Small Farms Systems Research; (5) Small Farms Marketing; and (6) Fertilizer Systems Development.

1.35 Inputs

The loan portion of the project will finance agriculture input commodities for small farmers in the Brong-Ahafo Region and facilities and equipment for MIDAS implementing institutions serving national agricultural sector needs. However, the requirements for the Brong-Ahafo Region will be given first priority attention by these institutions.

The major portion of grant financed activities will be focused on delivery of inputs and services to small farm families and institutions located in the Brong-Ahafo Region. These include technical services; training; vehicles; office; credit facility; administrative, and communication equipment; training/demonstration materials and equipment (including fertilizer); and field laboratory and workshop equipment and materials.

1.36 Proposed Agriculture Sector Loan

A complementary agricultural loan is being requested under a separate project paper. MIDAS II will be feasible without this loan, however, its potential for delivering greater impact on the target group will be substantially enhanced with the support of a Sector Loan. All commodities procured under the sector loan will be sold to generate cedis for local cost support of MIDAS (See Annex III - L for description).

1.37 Waiver Requirements (Loan)

(a) A proprietary procurement waiver in the amount of \$679,000 for seed processing, drying and conditioned storage equipment and farm machinery is required for the Ghana Seed Company. This is essential to assure standardization and/or compatibility with equipment procured from the U.S. during Phase I of project 641-0067.

(b) A source/origin waiver Code 935 in the amount of \$534,000 is required to procure electrical materials/equipment from England compatible with Ghana's electrical code and systems.

1.38 Waiver Requirements (Grant)

(a) A source/origin waiver to Code 935 in the amount of \$33,000 for procurement of manual typewriters from Brazil. Manual typewriters are no longer made in the U.S.

(b) A source/origin waiver to Code 935, a FAA Section 636(i) and proprietary procurement waiver in the amount of \$244,000 for procurement of Honda motorcycles from Japan and spare parts, compatible with those procured during Phase I. Motorcycles of the size and type required for the project are not manufactured in the U.S.

1.39: SUMMARY FINANCIAL PLAN (\$000s)

<u>A.I.D.</u>	<u>FX</u>	<u>LC</u>	<u>Total</u>	<u>Loan</u>	<u>Grant</u>
Seed	6149.3	58.5	6207.8	3147.1	3060.7
Small Farm Credit	2098.9	26.0	2124.9	35.8	2089.1
Extension	1301.4	55.9	1357.3	-	1357.3
Small Farms Research	1739.5	40.4	1779.9	-	1779.9
Small Farms Marketing	292.7	29.3	323.0	-	323.0
Fertilizer	346.	8.9	355.5	-	355.5
Small Farm/Pilot Program Equipment	6010.0	-	6010.0	6010.0	-
MIDAS Executive Committee	943.8	196.8	1140.6	-	1140.6
Escalation, AAPC Fee, Contingency	11356.8	544.2	11901.0	5807.1	6093.9
SUBTOTAL	30240.0	960.0	31200.0	15000.0	16200.0

<u>G.O.G.</u>	<u>\$ Equivalent</u>		<u>Percent</u>		
Counterpart Salaries		8791.7		22.1	
Value of Physical Facilities		5068.7		12.7	
Admin./Operational Costs		2100.2		5.3	
Other Costs		246.7		0.6	
Escalation, Contingency		23628.7		59.3	
		39836.0		100.0	
	<u>FX</u>	<u>LC</u>	<u>Total</u>	<u>Loan</u>	<u>Grant</u>
A.I.D.	30,240.0	960.0	31,200.0	15,000.0	16,200.0
G.O.G.	-	39,836.0	39,836.0	-	-

(c) A commodity procurement origin waiver in the amount of \$200,000 for shelf item procurement from neighboring countries of minor spare parts (fuses, batteries, tires, etc.), and construction materials that are in very limited supply in Ghana.

(d) A proprietary procurement waiver in the amount of \$421,000 for farm machinery is required for the Ghana Seed Company. This is essential to assure standardization and/or compatibility with equipment procured from the U.S. during Phase I of the MIDAS Project (641-0067).

1.4 Findings

The Mission has concluded that the project is technically sound and administratively, socially, economically and financially feasible and meets all applicable statutory criteria.

1.41 Technical

Ghana possesses the institutions and personnel with the capacity, outreach capability and basic rural development mechanisms, proven during Phase I, to implement Phase II if provided the required AID inputs. The most appropriate means of achieving the goal, objectives and end of project status targets is through the MIDAS strategy of an institutionalized, integrated and coordinated production inputs and services delivery system for small farm families in Brong-Ahafo Region. An IEE (Annex VII) has established there are no adverse environmental effects of the project.

1.42 Administrative, Social, Economic/Financial

The institutional and administrative environment affecting the project is acceptable for successful implementation. The rural society, although traditional in terms of its social organization and institutions, is receptive to the innovative MIDAS strategy. The project is economically and financially sound, and within the GOG's capacity to support after AID assistance ceases. The schedule for project inputs and increasing local capacity will result in the attainment of end of project status goals. Implementation will be accomplished by MPEC and USAID without additional direct hire staff. (See Part 3 - Analysis and Methodology).

1.5 Project Issues

During Phase I implementation and evaluation and Phase II design, issues were identified and addressed. The following issues will be addressed during Phase II:

- (a) An operational Ghana Fertilizer Company. (See Part 2.4 and Annex III D).
- (b) Availability of working capital for the small farms credit program. (See Part 3.6 and Annex III D).
- (c) Production inputs pricing policy (See Part 4.7).
- (d) Institutional capacity for Brong-Ahafo regional focus (See Part 3.1).

PART 2 - BACKGROUND AND PROJECT DESCRIPTION

2.1 The MIDAS Strategy/Approach from Phase I to Phase II

The Phase I project goal was to increase production and income by strengthening or restructuring existing Ghanaian institutions to enable them to deliver inputs and services needed by the large numbers of small farmers.

An integrated range of inputs and services required to attain this objective was identified, and a loan and grant package was designed and negotiated with the Government of Ghana to carry out the project.

The Phase I grant agreement was signed September 29, 1976. However, the loan agreement, expected to be executed at the same time, was not signed until December 12, 1977, and CP's for initial disbursement were not satisfied until May 11, 1978.

In the course of implementation of Phase I it became apparent that while progress was achieved with some of the components as planned, some actions expected to be taken by certain Ghanaian institutions and entities did not occur, thus delaying the attainment of project objectives. For example, the agreement to provide needed working capital to the Agricultural Development Bank was not met on time nor in the full amount. Some actions, such as the establishment of an operational Ghana Fertilizer Company, never took place at all.

This uneven pace of progress implementation of the MIDAS I project took place within a setting of abrupt and profound political changes; a gradual worsening, then accelerated economic decline characterized by a severe drop in domestic and foreign exchange accounts, runaway inflation and rapidly mounting debts. With a slowed growth rate, available resources were misallocated, and utilization of existing productive capacity diminished. As a consequence, performance of much of the infrastructure in place at the time MIDAS I was negotiated began to degrade.

As both GOG officials and the foreign donor community analyzed the decline in the Ghanaian economy, through discussion and negotiation they began to arrive at a consensus on a revised agricultural strategy. The essential elements of this strategy are that the national government will address the macro-economic policy issues and will formulate, either on its own initiative or in agreement with the IMF, a series of stabilization measures. At the same time various donors and the GOG agreed assistance in the agricultural sector to Ghana was most effectively provided through a number of regional-wide, integrated development projects with operations and impact targeted to more manageable areas.

While donors such as the U.K. and the World Bank, Federal Republic

of Germany and FAO have planned or have underway regional projects in the Upper, Northern and Volta Regions, the GOG requested the U.S. Mission to concentrate on the Brong-Ahafo Region.

Based upon the findings and recommendations of an in-depth evaluation of MIDAS I, and the findings of a redesign team effort, MIDAS Phase II has been developed to: Build upon the strengthening and the successful accomplishments of MIDAS I especially in essential national institutional building; Focus the grant and loan components of Phase II on the small farm families in the Brong-Ahafo Region.

Phase I grant funding by AID was \$5.5 million and loan funding was \$10 million. During 1979 an additional \$805,000 in grant funds were authorized and Phase I grant funds are fully obligated. As of June 10, 1980, PIO/C's have been issued for \$9,454,000 of the loan.

The Project Executive Committee has shown continual growth and development and increasing grasp of the complex techniques of managing and implementing the project. In accordance with the decision to focus Phase II on the Brong-Ahafo Region, an Executive Committee/sub-committee field implementation office and staff will be established in the Region in close coordination with Regional and District Administration and implementing institutions' staff and functions.

Functions and membership of the Project Advisory Committee set up in Phase I were found to largely duplicate the Executive Committee, and have been phased out. The monitoring/evaluation activity will continue to be managed by the Executive Committee and conducted by the Department of Economic Research and Planning Services, Ministry of Agriculture; the Bureau for Integrated Rural Development, University of Science and Technology; USAID representation.

2.2 Relevance to GOG Rural Development Strategy and CDSS

The recently elected civilian government has officially stated its commitment to agriculture and rural development. They have adopted a new strategy which shifts emphasis from the past policies calling for agricultural modernization through large scale mechanized state and private farms to providing better coordination at the regional and district levels to assist small farmers to increase production and realize an equitable return for their investment of capital and labor; improve rural/agricultural supporting infrastructure; and increasing alternative employment opportunities. The policy is designed to improve inputs and services delivery and marketing systems, feeder roads, communications, social services and facilities, and to motivate small farmers and rural inhabitants to actively participate in planning and implementing rural development programs.

The agriculture policy states "the apparent cause of failure of past programs are several, namely lack of specific guidelines and directives for actions and inadequate financial support; the former being the more deleterious. With our present precarious foreign exchange position... it needs not be emphasized that the country must now rely more heavily on its own internal resources".

The policy gives priority attention to increasing food production in six main sectors: crop development and production, livestock production, fisheries, farm input support and infrastructure and support services such as extension information dissemination, planning, budgeting, monitoring and administration programs. The crops are maize, rice, sorghum, millet, food legumes, root crops and vegetables. The CDSS and MIDAS Phase II support these policy actions.

Phase II is designed to resolve the constraints identified by the Government and which are within the project's scope of activities. (See Annexes III A and B descriptions of the Brong-Ahafo).

2.3 Project Component Coordination

The Phase II project will seek to achieve and verify the attainment of this objective largely through the coordinating effort of the inter-agency MIDAS Project Executive Committee. MPEC utilizing the feedback from extension and monitoring of the project, will manage, administer, coordinate and integrate implementation activities.

Illustratively, the process will start with the small farms research component, through field trials, testing and demonstration, designing a "production package" of inputs and techniques deemed suitable for application to small farms in the Brong-Ahafo Region. Extension will introduce the production packages to the farmers, provide training and guidance on applying it, observe the results and the farmers reactions. They will then feedback information to Research and the other components on performance/acceptance of the respective inputs or services, for modification/improvements. Extension will also perform a field liaison role on implementation activities/inputs among the implementing institutions, delivery system, farmers and MPEC.

The Seed Component will multiply the existing proven varieties on foundation seed farms and rely on research to identify, test and prove new varieties for inclusion in the multiplication program. The GSC will rely on certified seed contract growers to produce the certified seed for distribution to farmers. The GSIS will inspect, test and certify the seed to assure its quality. The seed and other inputs will be distributed through the delivery system developed by the GSC in coordination with other

implementing agencies and the commercial private and quasi-private firms distributing and marketing inputs. The delivery and marketing systems will provide services to farmers where, when and in the quantities needed. GFC will rely on research and extension findings on crop response and yield reports to determine the blends of fertilizer to import, and on information from extension, research and the credit facilities to determine the amounts of fertilizers needed for the Brong-Ahafo Region.

Farmer application of the production packages, and management and production practices will require loans from the credit component. Extension will assist the credit facilities to identify farm credit needs, eligible farmers, and supervised credit utilization. Extension will also assist the credit component to identify existing groups/associations and in organizing new groups for group loans. Credit and Extension will jointly identify production input needs and estimate production yields; advise the delivery and marketing systems of the amounts and types of inputs and market services demand in given areas; advise farmers of the location and availability of the inputs; and provide farmers with market intelligence.

To improve the overall operational efficiency of the Ministry of Agriculture there will be increased pre-service and in-service training, provision of transport, and regional and district committees formed to assist in implementing and monitoring the programs. Under the GOG's 1979/80 import program, licences worth G 52,000,000 (\$19,000,000) from GOG's own foreign exchange resources have been allocated to the Ministry of Agriculture for inputs importation.

The project will require cooperation, inputs, service and/or information from all of the respective project components and non-project entities, i.e., seed, fertilizer, appropriate technology hardware, farm and socio-economic environment data, findings from national and international research institutes, and small farm systems management and production practices data. Findings will be fed back to the respective components/institutions by research for modification/improvements to their inputs and services, i.e., performance/germination of the seed; fertilizer blends; technology hardware; information extended; etc.

2.4 Description of Phase II Grant Activity Sub-Components Total Life of Project Grant Funding and GOG Contribution.

Total inputs: \$56,031,000; AID: \$16,200,000; GOG: \$39,831,000.

(For details of AID and GOG inputs see Annex VI, Financial Exhibits).

(a) Seed Multiplication and Distribution:

Total inputs: \$18,486,000; AID: \$4,889,000; GOG: \$13,597,000.

The objective is to provide sufficient quantities of improved and proven varieties of seed at a cost acceptable to Ghanaian farmers to enhance their productive capacity and reflecting real market value.

The organizational structure and operational capacity of the GSC were strengthened during Phase I, and have resulted in improved management and production on the four Foundation Seed Farms. The GSC foundation seed farms multiply breeder seed developed, tested and proven by research into foundation classification on the farms under special management to assure genetically pure and disease free seed. The foundation seed will be sold to selected contract growers who will multiply it to certified classification to be purchased by the GSC. GSC will process, dry and store both foundation and certified seed and subsequently distribute and sell the certified seed to farmers. (See section Annex III D). The seed will be distributed through the project distribution/delivery system. (See section V.7). The GSC is a national institution and will service national seed needs, however, seed demands in the Brong-Ahafo Region will be given priority attention.

Some of the required grant funded farm machinery, trucks for seed distribution, vehicles and other essential commodities have been received and are operational on the farms. Additional commodities will be provided in Phase II. Sixteen staff members have received 100 months of training in the U.S. Several one-week in-service training seminars were held in Ghana. The processing, drying and conditioned storage equipment for the Winneba and Kumasi plants has been ordered and is expected in the country by December 1980. The GSIS is being formed, autonomous from the GSC, to preclude the GSC inspecting and certifying its own product.

During Phase II, the permanent headquarters of GSC will be established and transferred from the temporary quarters and their organizational structure and operational capacity further strengthened with grant funded technical assistance and training. The GSIS headquarters in Accra and the regional centers in Kumasi, Tamale and Ho will be established and staffed to assure proper testing, inspection and certification of seed.

The quality/germination rate of the distributed seed will improve with installation of the loan financed processing, drying and conditioned storage equipment. Three centers, Winneba, Kumasi and Tamale will be in operation by year five.

(b) Small Farm Credit Expansion

Total inputs: \$21,638,000; AID: \$3,369,000; GOG: \$18,269,000.

The objective is to provide annual operating and mid-term loan funds to new small farm borrowers cultivating 10 acres or less annually. Access to regular and timely credit will allow the small farmer to purchase the required agriculture inputs and hire the necessary seasonal labour to increase his production and net income.

MIDAS I made provisions for the ADB to establish 39 new credit facilities throughout the country to make credit services available near large concentrations of actual/potential small farms. Seventeen new credit facilities were actually established, including three in Brong-Ahafo.

Under Phase II, ADB will establish ten credit facilities and BOG will establish seven rural banks in Brong-Ahafo by year 5. These seventeen credit facilities plus the six existing facilities will provide the credit needs for the 23,000 new and 20,000 existing borrowers. Production loans will be disbursed when required for land clearing, planting and production inputs, crop maintenance, harvesting, processing and marketing. Mid-term loans will be available for purchase of small farm equipment, on the farm and village storage facilities and other capital investment to be amortized over a 1 - 1/2 to 5 year term. Much of this credit will be handled through group loans. Credit operational expenses and servicing costs are much reduced through group loans. Delinquency rates are lower, primarily due to peer pressure for repayment. Much of the credit will be made through group loans at the village level. Supervised credit and delivering other services are also easier, more effective, and less expensive through groups than to individual borrowers. Credit facility field and supervised credit staff will monitor end use of the production inputs. Technical assistance will be provided to help the banks continue streamlining and simplification of their loan making and servicing procedures. The training curriculum and on-the-job evaluation of participants will be flexible to adjust to the personnel training requirements of the credit facilities as they expand.

(c) Extension Demonstration

Total inputs: \$6,114,000; AID: \$2,149,000; GOG: \$3,965,000.

The Phase I objectives were: (1) to expand the field demonstration programs of the Extension Service to 200 trials annually and the Home Extension Unit to 100 trials annually using appropriate fertilizer mixes and improved seeds and cultivating practices.

Phase I performance of the extension service achieved about one-third of the planned target trial demonstration. This was largely due to the lack of transportation and the unplanned additional responsibility for procuring fertilizer and distributing production inputs to farmers.

The Phase II objective is to: improve the organizational structures and outreach capability of the extension service and the home extension unit in the Brong-Ahafo Region, and strengthen their capacities to effectively deliver educational services to and facilitate production increases for small farmers. This will be achieved by providing transportation, better coordination and integration of activities of the other MIDAS II project components; liaising with the project and non-project institutions and the small farmers; interpreting research and other rural development findings and adapting them to local circumstances; demonstrating proper utilization of the results of the findings and production inputs; extending information from all the implementing institutions to the rural population; and feeding back information on reactions and results from the farmers. Fertilizer and other production inputs will be distributed through the delivery system, relieving extension of this responsibility. Twenty-five tons of fertilizer will be provided for trial demonstrations. Technical services will be provided to assist extension achieve its objectives.

The first year the effort will focus on ten sub-districts of the region. As the staff increases its competence through training and experience, the program will subsequently expand to other sub-districts, covering the entire Region by year five.

The current field staff of 153 agents serving 510 families each will expand to 269 serving 291 families each by year five. This is a manageable number of families.

The transportation being provided will improve mobility of the field staff for farmer training/guidance activities in Brong-Ahafo. Individual farm visits will be held to a minimum and conducted only when particular problems arise requiring such visits/consultations. The bulk of the farmer training will be through/with groups such as villages, production or other associations, loan groups, etc.

Most of the small farm families in Brong-Ahafo will be reached to some extent by extension service. Eighty percent will be effectively reached with adequate service and guidance to foster/result in significantly improved management and production practices.

The Home Extension Unit, supported by the Department of Home Sciences of the University of Ghana, will be strengthened by training, providing inputs, etc., to serve more women in their roles as farmers, farm labourers

and home managers and to help improve the living standards of farm families by (a) encouraging improved production and consumption of nutritious foodstuffs; (b) encouraging improved storage, processing and preservation techniques to minimize food losses and to increase food availability throughout the year, and (c) extending information on improved management techniques of the farm and household resources.

(d) Small Farms Systems Research

Total inputs: \$5,734,000; AID \$2,877,000; GOG: \$2,857,000.

The small farms systems research component will assist GOG to establish an applied, multi-interdisciplinary small farms research capability. The objectives are: to obtain a sound knowledge of the existing farming systems, the socio-economic environment, and their positive and negative factors in the locality serviced; to conduct research that is relevant to these circumstances and that responds to the needs of the small farmers; to identify soils and farm management and production practices that ~~eliminate~~ eliminate constraints, and to increase small farmer production and incomes.

This will be done by: (1) establishing a ten-acre research station in Brong-Ahafo Region on which new food crops varieties and farm management and production practices are introduced, tested and proven applicable; (2) developing a system of land management for increasing and maintaining soil fertility of the upland and hydromorphic soil regimes of the area, extending the cultivation period of a given piece of land, and reducing the frequency of slash and burn shifting cultivation; (3) developing management/production packages appropriate for men and women farmers; (4) placing research plots on or among farmers' fields where foodcrop varieties and soils are representative of the area and where improved production and management practices can be demonstrated and their applicability easily observed by the farmers; (5) training of cadre of Ghanaians to assume responsibility for all aspects of the research program. Technical services, field, research and laboratory equipment will be provided to assist with implementation of this component.

By year five the research station will be in full operation, conducting research relevant to small farm needs. A cadre of Ghanaian researchers will have received training at local institutions, IITA and in the U.S. and assumed responsibility for the program. The staff positions and budget required for this will continue the research program, expanding it to other areas as conditions warrant.

(e) Small Farms Marketing:

Total inputs: \$917,000; AID: \$506,000; GOG: \$411,000.

The small farms marketing component will assist the GOG test and evaluate alternative interventions to improve food crop marketing so as to induce increases in production, particularly from small farms. The objectives are to

identify, test and evaluate, on a pilot basis in the Atebubu District Brong-Ahafo, approaches, inputs and incentives for increasing the efficiency of marketing small-scale-farmer produce. The findings will be the basis for designing and executing a more effective marketing system based on private sector participation and competitive market forces.

There will be three major interventions:

- (1) provision of loans at prevailing commercial interest rates to selected traders to test the impact that the availability of adequate working capital will have on the performance of farm gate marketing services, particularly, the volume of produce marketed by independent private traders;
- (2) establishment of a service center (mechanic workshop) as a limited liability company of the ADB for maintenance and repair of market-service transportation to increase the operating life span and decrease the down time of transportation units used for farm produce marketing;
- (3) improvements to the District Market places facilities for more efficient bulking and marketing of farm produce. Implementation activities will be continually monitored and a data collection system established for annual evaluations to assess the interventions applicability and identify needed adjustments. Successful interventions will be incorporated in marketing programs for replication to wider areas.

The ADB and the Development Finance Department of BOG are responsible for implementing the program. The BIRD/UST will monitor and collect data for subsequent evaluations. A team of marketing experts will conduct the annual evaluations of the program.

AID will provide grant funds to finance (a) salaries of two Ghanaian credit specialists posted to the Atebubu ADB Credit facility to administer loans to selected traders; (b) the trader loan program administrative expenses; (c) seed (working) capital for loans to participating traders; (d) establishing a service center workshop until and the first year salaries of the workshop staff; (e) salary of a Ghanaian Market Coordinator assigned to ADB to liaise with traders, market associations district institutions and officials to identify and design improvement to be made to District Market facilities.

(f) Fertilizer Systems Development:

Total inputs: \$1,006,000; AID: \$600,000; GOG: \$406,000.

The Phase I objectives were to: assist in the establishment of an advance procurement system, procuring fertilizer in bulk, blending, bagging and distributing it to small farmers, and designing and establishing an input distribution/delivery system. No implementation occurred, except for a one-time; importation of product which was unduly costly both to buy and ship, and arrived completely out of phase with the requirements of the Ghanaian growing season due to the untimely scheduling of the transaction.

Apart from the appointment of a non-functioning Board of Directors no progress was made in organizing a Fertilizer Company.

Accordingly, for MIDAS II, the original goal of establishing a local procurement/bagging/blending and distributing entity has been dropped. The recast Phase II objective is limited to providing technical assistance to assist in designing and establishing the procurement and distribution of bagged, blended fertilizer and designing and establishing the input delivery system. With the help of USAID technical assistance, and the integration of the fertilizer effort with the other project components, the product will be accessible to many more small farmers at a significant reduction in cost per unit of plant nutrient.

(g) MIDAS Project Executive Committee:

Total inputs: \$2,136,000; AID: \$1,810,000; GOG: \$326,000.

The objectives are: (1) to strengthen the existing inter-ministerial project Executive Committee in Accra responsible for overall project implementation and management, policy and program decisions, coordination and problem solving at the ministries and national institutions level, and (2) to establish a project field implementation committee and staff in Brong-Ahafo, responsible for field level implementation actions.

The administrative units making up the MPEC are the agricultural and agricultural-related institutions involved in project implementation and/or whose participation is important to project success.

Achieving the goal, purpose and end of project targets requires levels of management and commitment from, and activity coordination of implementing institutions that is possible only through an executive committee composed of sufficiently high ranking officials that are given a mandate with the authority and responsibility needed to execute the program.

MPEC was established by Executive Decree 165-1978, having the effect of law and which specified the minimum rank of most of the members. The committee is empowered to establish sub-committees and take related actions as required.

Membership is composed of: Chairman, Minister of Agriculture or his representative; Project Manager, not less than Deputy Director of Agriculture, MOA; MOA - Principal Secretary; MFEP - Chief Planning Officer; BOG - MIDAS Project Officer; ADB - MIDAS Project Officer; GSC - Chairman of Board; GFC - Chairman, Board of Directors; AG - Chief State Attorney; USAID - Coopted, Agriculture Development Officer.

Responding to the decision to refocus the project from national to a regional scope, an MPEC-B/A Field Committee will be established as a sub-committee of MPEC. MPEC-B/A will be responsible for detailed planning, implementation/monitoring and evaluation of project field activities; strengthening the project's role and relationship with Government and other relevant services at the regional/district/sub-district levels; and assuring

that inputs and services reach the farmers in a regular and timely manner.

The MPEC and Regional Minister have agreed that the Field Committee membership will include the following personnel currently posted to Brong-Ahafo: Chairman - Regional Minister or his representative; Members - Regional Agricultural Officer, Regional Agricultural Coordinator, Regional Heads of participating institutions, USAID - coopted, two farmers from the target group.

2.5 Description of Phase II - Loan Activities (\$15,000,000)

In addition to the grant-financed technical assistance, training and commodities described above, Phase II has a loan-financed component intended to finance essential inputs required to meet project requirements, mostly in the Brong-Ahafo Region. Commodities to be financed under the Phase II loan are described below:

(a) Seed Processing Equipment Supplies Vegetable Seeds and Agricultural Chemicals (\$5,368,000)

The commodities will support the Seed Multiplication component whose institutional responsibilities are national in scope and who will therefore utilize some of the commodities outside Brong-Ahafo Region. However, the MPEC/GSC will assure that priority attention is given to satisfying the demand for improved seed inputs in Brong-Ahafo.

Phase I provided \$1,584,000 in loan funds to finance seed processing drying and conditioned storage equipment, seeds laboratory equipment and maintenance shop tools and equipment for two plants. The commodities began arriving in country in March 1980, and deliveries will continue through CY 1981.

Phase II loan funds will finance seed processing, drying and conditioned storage equipment for one processing center; seeds laboratory equipment for two centers; electrical switch gear and insulation materials for three processing centers. GOG and GSC will finance installation and commissioning of the equipment already in the pipeline, and land acquisition, construction and equipment installation for the balance of the seed processing plants.

(b) Small Farm Equipment and Commodities (\$9,632,000)

Commodities under this category will include such items as small farm equipment (appropriate technology hardware, low horsepower 14-20 hp tractors/equipment; animal-powered equipment, small rural shops hand tools/equipment; agriculture/rural production, storage and marketing processing tools and equipment; small fishermen equipment and gear) and raw materials for the local production thereof; vegetable seeds; agricultural chemicals identified and assessed in the IEE, (see Table 2, Annex VII), and such other small farm and agriculture inputs and supporting enterprise tools and equipment as the GOG requests and AID approves through Implementation Letters.

Insects, plant pests and diseases, and crop competition from weeds and grasses are serious problems. The required agriculture chemicals have been identified and tested for in the environmental impact, which has been discussed in Annex VII. The latter are important under minimum cultivation practices to be developed under the Small Farms Research component. An environmental analysis was prepared (see Annex VII) by a member of the Phase II design team predominantly on agriculture chemicals. Agriculture chemicals procurement will be limited to those on the approved list and a condition precedent will assure that utilization is in line with recommended practices.

PART 3 - ANALYSIS AND METHODOLOGY

3.1 Administrative Feasibility

Successful administration of an integrated rural development program depends upon effective coordination of planning, decision making and implementation by a number of different agencies and organizations. These organizations must have authority to commit the human, financial and material resources required to perform project activities, and an agreed mechanism for mobilizing these resources, monitoring their deployment and evaluating performance.

The Mission has concluded that the MIDAS project executive committee (MPEC) utilizing its secretariat staff, and suitably modified to accommodate the major shift in focus from largely national-level institution building to a regional development effort in Brong-Ahafo, is a feasible way to carry out Phase II activities.

Under MIDAS Phase I, under authority of its decree, MPEC has established a central management structure and leadership channels which have assured attention to project needs at suitably high executive levels in the implementing ministries and financial institutions.

The central MPEC mechanism, which has performed functions of detailed planning, coordination, monitoring and evaluation will continue these oversight tasks under Phase II, but in addition, by establishing a MPEC sub-committee in the Brong-Ahafo region, it will effectively decentralize its authority and responsibility to the regional/district/sub-district levels.

The GOG MIDAS project manager will relocate the MPEC field implementation committee function in Brong-Ahafo to shorten span of control, and at the same time, retaining the essential linkages to the central ministries and headquarters of the financial institutions. Thus, the revised MIDAS Phase II MPEC will be able to assure timely and effective actions at the field level, while still retaining MPEC and USAID capability of initiating up to ministerial level, interventions as needed to settle issues unresolved at the field level.

During Phase II, increased emphasis will be placed on MPEC's assuming more responsibility for procurement and budgeting actions. Also, management systems will be standardized to allow better control, sufficient planning time and more consistent policies in the course of project implementation.

It is intended that a limited amount of technical assistance, largely through short-term consultant services and training, will be provided to the MPEC secretariat, to further strengthen its implementation, monitoring and evaluation capacity.

3.2 Technical Feasibility

The project is designed to focus upon and resolve the major production constraints faced by the small farmers. The technology has been designed taking into account the skills, knowledge and level of development of the target group. The technology to be implemented in Phase II was identified and designed, by drawing upon a comprehensive Phase I evaluation, baseline data surveys and work done by the Phase II Design Team. The technology is feasible given the existing environmental, agronomics, socio-economic and resource base circumstances.

Increasing production and providing more equitable distribution of development benefits in rural areas requires that small farmers have access to improved "packages" of production inputs, delivery systems, information, credit and marketing facilities. Production increases require that production packages consisting of seeds, fertilizer, pesticides, appropriate technology hardware, farm management and production practices be developed and tested by research, extended to farmers by extension, and financed by credit. Less than optimum production will be realized when any of the component parts of the package are not available. ~~Increased~~ ^{Although} production ~~can~~ ^{can} be achieved with partial packages. The Mission has concluded that there are no significant technical constraints that will adversely affect Phase II project implementation.

The packages will be based on improved production and resource management techniques, ready availability and access to production inputs, credit to purchase them, and social/cultural acceptability of the packages.

Research has and will continue to identify constraints in key areas of management, production, storage and marketing. The type, quantity and quality of production inputs and services delivered to and used by farmers will change and evolve as research and use, validate or disprove initial assumptions, and as Ghanaian institutions become more sophisticated in their operations.

The credit facilities established under the project will assure that credit access coincides with input availability. Extension services will disseminate information about production inputs and credit availability.

(a) Seed Multiplication

High quality improved seed production requires more time and expense than general crop production, to insure that the genetic purity and the seeds' capacity to produce the higher yields not be diluted. This extra effort is justified and economically sound only if the quality is retained through fast and proper processing and storage.

The GSC will produce only foundation seed. All certified seed will be produced by contract growers. The GSC will provide foundation seed to and purchase from its contract growers and process, store and distribute the certified seed. Individual farmers will thereby participate earlier in the program resulting in a more effective and efficient operation.

Seed inspection and certification responsibility has been removed from the GSC, precluding inspection and certification of its own product. The GSIS is being established, autonomous from the GSC, and will be responsible for inspecting all aspects of foundation and certified seed production, processing and storage, testing the seed for germination rate, purity and quality, and certifying it. (See Annex III.D).

The technology for seed multiplication was tested and proven during Phase I. Production/harvesting farm machinery was procured and is operational on the foundation seed farms. Using this machinery, the management and operation of the farms continues to improve, with corresponding yield increases.

Using the existing processing equipment, certified seed, available for distribution in 1979 was about 50% of the target. Because the rains extended throughout the harvest period, the small, inefficient capacity was inadequate for the task of drying, processing and storing the entire amount needed.

The varieties of seed being produced and marketed were developed, tested and proven over the past several years by the Crops Research Institute; the Grains Development Board; the International Maize and Wheat Research Institute, Mexico City; and the International Institute for Tropical Agriculture, Ibadan, Nigeria, through extensive field trials on farmers' fields. Appropriate mechanization permitting timely and better seed-bed preparation, cultivation and harvesting, resulting in increased yield and better quality seed per acre, compared to labor-intensive methods. The farm machinery was selected based upon power needs, labor availability and time constraints for production and harvesting activities.

In Ghana, average field level moisture content of maize at harvest time is 16%. The average annual atmospheric conditions are 87 degree F and 85% humidity. Under these conditions, without proper processing, drying and storage, the viability/germination rate of seed will decrease 50% in 6 months, and 70% in 10 months. Since the improved seed is harvested at the same time as the general food crops, it must be held over in storage 6 to 10 months until the next planting season. In addition, 25% each of the annual breeder, and foundation seed requirements must be held over for 18 months to preserve the basic seed stock should a drought or other adverse conditions occur.

High seed germination and viability require that the seed moisture content be reduced to and held at a maximum of 12% and storage conditions be controlled at a maximum of 70 degrees F and 50% relative humidity. This is impossible with natural storage. Without controlled storage conditions, the seed moisture content stabilizes at 14.5% in 2 months even though previously dried to 12%. Ideal storage conditions occur when the temperature and relative humidity total 100. The 87 degree F temperature plus 85% relative humidity in Ghana total 172, an unacceptable storage condition to assure farmers receive viable, high germination rate seed.

Air conditioning while less effective than refrigeration is adequate for maintaining the proper conditions in storage. Air conditioning will maintain a conditioning factor of 120, which is acceptable, but the maximum allowable. However, insects are active at this conditioning factor and seed treatment will be required.

(b) Small Farm Credit Expansion

The technology for this component was tested, modified and utilized during Phase I. For Phase II, the geographical area of coverage was reduced from national to regional scope, from a planned 39 credit facilities nationwide to 17 in E/A. Accordingly, the number of small farmer borrowers to be serviced has been reduced from 68,000 to 43,000, to correspond to the resources available to the project.

During Phase I only about 1/4 of the small farmers' annual production credit needs were met, in order to serve, at least partially, a larger number of borrowers. This created problems for the farmer in obtaining sufficient money for required production inputs, and resulted in repayment problems for the ADB. Under Phase II the total annual production credit needs of the borrowers will be provided.

Simplification of the application, processing, making and servicing of loans has been tested and proven. The rural credit facilities' managers have now been authorized to make over-the-counter loans, thereby reducing the time between application and disbursement of funds.

The new credit facilities, will be so located as to avoid overlapping areas of coverage, and to assure maximum servicing coverage of the small farmers in the region. A marketing/extension supervised credit officer will be provided at each facility to assist the farmers to identify/determine their credit and input needs, to provide/extend market information, to coordinate these functions with the relevant institutions, and to monitor their utilization.

To the maximum extent possible, credit will be dispersed through group loans. Making and servicing a group loan requires about the same time as an individual loan, thereby reducing the administrative load while serving a larger number of borrowers. Communication and supervision are far easier and less time-consuming with groups and recovery rates are increased because all members of the group must repay their current loan before any member can obtain a subsequent loan. Peer pressure is much more effective than external efforts to press for loan repayment.

The major causes of decapitalization/erosion of working capital are due to inflation, over-valuation of the Cedi, and the general state of the economy. (See Section 3.6). Steps are being taken to assure maintenance of the value of the working capital.

Source/Application of Small Farm
Credit Expansion Fund

I. Sources of Credit Funds

MIDAS I Cedi Input Residual	...	¢ 19,591,305
MIDAS II Cedi Input	...	34,940,330
ADB Turnover	...	176,533,119
GOG Contribution	...	<u>206,187,086</u>
Total	...	¢437,251,840 =====

II. Application of Funds 1/

New Borrowers (23,000)	...	¢196,371,840
Existing Borrowers (20,000)	...	<u>240,880,000</u>
Total	...	¢437,251,840 =====

1/ Existing borrowers' requirements will accrue from year one. New borrowers requirements will gradually accumulate over the life of the project.

SOURCE/APPLICATION OF SMALL FARM CREDIT EXPANSION
FUND (Continued)

Borrowers	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Existing (20,000)	¢24,851,377	¢24,828,974	¢24,130,400	¢27,019,200	¢32,228,000	¢133,057,951
New (23,000)			2,282,051	31,421,074	39,426,010	73,129,135
Total	¢24,851,377	¢24,828,974	¢26,412,451	¢58,440,274	¢71,654,010	¢206,187,086

(c) Extension Demonstration

The Extension Service and the HEU have experienced agents to provide training to farmers, farm laborers and home managers in ten sub-districts initially. Using the Extension Service and HEU to extend services to farmers is technically feasible in B/A. Training and on-the-job experience of additional agents will permit expansion throughout the region by year 5. Continual in-service training in the technology will be provided at the Wenchi training center and on-the-job. Technical services will be provided to assist the Extension Information and Research/Extension Coordinating Unit, the subject matter specialists and the training center in their field staff training and support functions.

Provision of pickup trucks, motorcycles and bicycles will assure mobility of the field staff for field work/farmer training and guidance.

Appropriate staff will be posted at the Regional, District and Sub-district levels to conduct the extension activities. A Peace Corps Volunteer with extension/agronomy training and experience may be available to assist with the extension research assessment/information activity. (See Annex III.D).

Home Extension Unit

The technology was tested and proven during Phase I. Through trial demonstrations on the farms and back yard gardens improved production practices were introduced increasing production. The introduction and acceptance of a wider range of vegetables and food legumes provided the source of more nutritious food. Training in food preservation, storage, nutrition/diets increased and extended availability and family consumption of these foods.

Labor savings/sanitation technology such as smokeless stoves and work tables/cupboards/water jugs for preparing food/storing utensils off the ground reduced the drudgery and time spent and improved sanitation.

The demonstration homes proved effective for reaching and increasing the receptivity of the rural women to better utilization of the farmstead for producing small animals/protein, fruit trees and vegetables, home improvements and improved living condition. They were also effective for upgrading the skills of the field workers. (See Annex III.D).

(d) Marketing

The technology relies on market forces and assures the availability of inputs, services and incentives for those participating in the system, and establishes the minimum of equipment and physical facilities needed to enable the system to function. The technology provides responses to the constraints identified in a one year baseline survey; monitoring to observe and collect data on impact and results; evaluation to assess progress; and flexibility to modify actions.

The market transportation maintenance/repair center will reduce market transportation equipment down-time due to lack of maintenance/repair facilities. Training will be provided the service center staff in establishing management, accounting and inventory-keeping procedures and in the use of these procedures.

The District's market places are inefficient due to their poor condition and/or lack of facilities. Improvements in facilities and utilities will be made to the market places, with the order of priority to be determined by the participants in the marketing system to assure their participation and contribution to the program. (See Annex III).

(e) Small Farms Systems Research

The objective is to assist the GOG to develop a capability in applied multi-interdisciplinary small farms systems research. To develop an improved technological package for B/A small farmers, a systematic and coordinated, problem-oriented research strategy has been designed on farm and soils management, and production practices. This effort has been adapted to the physical, ecological and climatic conditions, and institutional and socio-cultural factors, based on recently-completed baseline studies: "Economics of Small Farm Systems and the Socio-Economic Conditions of the Atebubu District, Brong-Ahafo". Monitoring and baseline data updating will be a continuing activity to measure research acceptance by and impact on small farmers' production and incomes, agriculture and rural development.

The research priority will focus on precise identification of critical constraints to improving farmers' productivity. This will take account of interrelationships between various crops and farming systems, and the agronomic, physical, biological and socio-economic factors, and the small farmers'/rural populations' behavioral environment.

There have been and still are research gaps in Ghana. Much of the research conducted so far has been inadequately designed and tailored to solve real, immediate rural development needs, and has slighted the essential linkage between economics, technology and the social environment.

To assure relevance the research will be based on knowledge of: the existing farming systems and agricultural practices; the constraints inhibiting agricultural/farming development; and will be focused on identifying or adapting innovations which are profitable, practicable and responsive to the farmers' needs. Regardless of its scope or focus, biological/agronomic research does not and cannot stand or operate alone. The findings of the research effort will be extended to the target population through the Extension Services, field trials and related activities, assisted by the credit component's marketing/extension/supervised credit staff with appropriate focus on the women's role in agricultural production and the home. Therefore, it will be a component part of an integrated development design.

In addressing the total scope of the small farm problem, the research undertaken will include farming systems/farm management; soils management; duplication of farm conditions and rural circumstances (labor constraints, economics, social mores); input availability; maintaining equilibrium of the farming systems; multi-inter-cropping; crop storage; and introduction of improved varieties of crops. (See Annex III.D for additional discussion).

Technical services will be provided to assist the GOG design and establish the small farms systems research program. Participant training will be provided to develop the research skills of the staff.

(f) Fertilizer Systems Development

Technical services will be provided to assist the GFC design an advance procurement plan and the projects inputs distribution/delivery system.

The GFC will coordinate with each implementing institution responsible for providing production inputs and incorporate their particular requirements for input distribution and, where feasible delivery activities already underway, into an overall project distribution/delivery systems. A minimum of 45 rural retail outlets have been identified as needed in B/A, requiring that the average maximum distance a given farmer must travel to an outlet to purchase inputs will be 10 to 12 miles. (See Part 4.7 for description of production inputs distribution/delivery system).

Currently, three blends of fertilizer are imported; 15-15-15; ammonium sulphate; and 20-20-0. Few Ghanaian soils are deficient in potash, therefore, one-third of the gross weight and plant nutrient content of the 15-15-15 fertilizer imported requires the expenditure of scarce foreign exchange with very limited benefits resulting to the farmers of Ghana.

Sea freight and inland transportation make up much of the total cost of fertilizer. For Phase II higher plant nutrient concentration fertilizers; diammonium phosphate 21% N and 50% P₂ O₅; urea 46% N; and Muriate of Potash 60% K₂O will be imported for trial demonstration purposes. They will provide the same amount of plant nutrients in about half the gross weight compared to fertilizers imported in the past, thus, will reduce the total cost of fertilizer imports. The Extension Service will train the farmers in the proper application of the higher concentrate fertilizer to avoid crop damage from improper/over application. If proven successful and given proper training and adequate supplies, it is expected that high concentrate fertilizers will totally replace the lower concentrate.

(g) MIDAS Project Executive Committee

MPEC/Accra and MPEC, Brong-Ahafo are the Coordinating mechanisms without which the project would be little more than a series of associated actions.

The primary constraint to increasing small farms production and incomes, and improving rural welfare is limited access to production inputs and services. To extend access requires a high degree of coordination and integration within and among the implementing institutions and between the project and non-project entities delivering the needed inputs and services. MPEC serves this function.

MPEC/Accra is a high-level interministerial committee established by Executive Decree, having the effect of law, responsible for: executing implementation of the project; strengthening the organizational structure and capacity of the participating institutions to perform their respective roles; improving the coordination among the implementing institutions to provide the inputs and services where, when and in the amounts required to directly reach and benefit small farmers.

With the shift of focus from national to regional level, an MPEC sub-committee will be established in B/A. MPEC/Accra will be responsible for policy issues, coordination and problem solving at national ministry/institution level and top management/implementation actions. The Committee/field staff will be sited in B/A responsible for field actions/implementation. MPEC/Brong-Ahafo will be chaired by the Deputy Regional Minister. Membership will include: 1) Project Manager; 2) Chief of Field Operations (MOA Regional Coordinator); and Regional Representatives of the implementing institutions. MPEC/Brong-Ahafo will be responsible for detailed planning, coordination, implementation, monitoring and evaluation of project field activities; strengthening the project's role and relationship with Government and other relevant services at the regional/district/sub-district levels; assuring the inputs and services reach the farmers in a timely manner.

3.3 Social Soundness Analysis

(See Annex IV.E)

3.3.1 Summary Impact of the Project on Women

As designed, each of the sub-components of MIDAS II shows enormous potential for positively benefitting rural women in the Brong-Ahafo Region. Women play a crucial role in the entire food chain of the rural community in food production, processing, preservation, marketing and consumption. A large percentage of the women in the area cultivate their own fields, in addition to providing between 40-60% of total family agricultural labor. They help in planting, weeding, fertilizer application and harvesting, and are almost solely responsible for the processing and preservation of the crops. Almost every woman grows a vegetable garden. In the Atebubu district, women wholesalers dominate the yams and cassava trade. Given women's significance in agricultural production and marketing, the MIDAS project, to attain goal level targets, must focus much of its attention on women.

The following recommendations will help assure that women receive project benefits through access to Phase II credit, inputs and services, and technology: (1) Successful performance of the extension service is the key to women enjoying project benefits. Extension workers should receive training in how to work with women farmers and farm laborers. It is suggested that given the socio-cultural environment, a group approach to working with women is desired. Frequent and regular in-service training workshops should also deal with application of research findings from the small farmer research component and dissemination of information on credit and inputs. (2) The Home Extension division expects to start with two women agents in the first year in the Atebubu district and will expand into the adjacent areas as more personnel are available. These women should participate in the extension in-service training given to regular MOA agents to assure consistency of information given to farmers. (3) The Home Science Department at the University of Ghana, Legon, is presently involved in research on food processing and preservation techniques and other appropriate technology specifically for women. Their research should be encouraged, and should be interaction between the Department and the MOA. (4) It is crucial that a monitoring system be established to insure women's accessibility to all project benefits.

The project sub-components address the many and varied roles women play in the food system. MIDAS includes both certain activities aimed at aiding women to better fulfill the responsibilities which fall within their sphere (especially the home extension and demonstration aspects), and also focuses on women as important integral members of the agricultural production system. The above measures will attempt to insure that women have access to and participate fully in project activities.

The following table (3.31) shows the participation of women in obtaining credit, farming and marketing:

TABLE 3.31

LOANS MADE TO MEN AND WOMEN BY TYPE AND SCHEMES - ADB ATEBUBU
BRANCH - 1979

(1) Caseload by type loan:

Type Loan	No. Men	No. Women	Total
Food Crops	4010	633	4643
Food Marketing	115	367	482
Total	4125	1000	5125

(2) Caseload by Crop Schemes:

Schemes	Men	Women	Total
Yam	2530	338	2868
Rice	720	143	863
Guinea Corn	243	33	276
Maize	118	27	145
Groundnuts	117	30	147
Garden Eggs	74	37	111
Cassava	7	2	9
Pepper	4	6	10
Food Marketing	36	232	268
Sub-Total	3849	848	4697

(3) Caseload by Individuals:

Food Crops	197	17	214
Food Marketing	79	135	214
Sub-Total	276	152	428
(4) Grand Total	4125	1000	5125

(5) Summary:

86% Food Crop Loans are disbursed to Men at Atebubu Branch
76% of Marketing Loans are disbursed to Women at Atebubu Branch.

3.4 Environmental Analysis

Based on an interpretation of Part 216, Environmental Procedures, of Amended Regulation 16 of the Code of Federal Regulations which establishes guidelines for preparation of the IEE, one condition precedent will be incorporated in the project agreement in support of a Negative Determination in the MIDAS Phase II IEE. The condition precedent involves the proposed use of the pesticide, Phostoxin, at the regional seed centers and by producer contract seed farmers to fumigate bagged Foundation and Certified seed. The pesticide is potentially very hazardous to humans and is in the U.S. Environmental Protection Agency's "restricted use" category on the basis of user hazard. The IEE includes a provision for making the GOG aware of the risks.

Three reasonably foreseeable impacts in the natural and human environment have been identified: (1) use of fertilizer procured and distributed under the project; (2) expansion and distribution of improved, high quality seed; and (3) use of pesticides on the seed multiplication centers, experimental plots, and on a small number of farms of cooperating producers.

Some potential negative impacts associated with fertilizer use were identified (accumulation of nitrates in underground water, crop plant injury, interference with soil microbes), but because of the likely low intensity of fertilizer use, no significant environmental impacts are envisioned.

No significant negative impact on the environment is anticipated with the seed multiplication activities. The construction activities will entail clearing of some native vegetation from the construction site and also disturbance of soil but will affect only a very small area. The potentially most harmful impact involves the use of pesticides. However, only pesticides registered for the same or similar uses by the U.S. Environmental Protection Agency without restriction (without active or proposed regulatory action) are requested. The three requested, carbaryl, diazinon, and malathion, are used widely in the USA for the same or similar uses proposed here and are considered to be generally safe if used properly according to instructions provided by their manufacturers. Project personnel will ensure that appropriate safety procedures are adapted and that the pesticides are applied only under close supervision of authorized project personnel.

With the exception of the use of one pesticide, Phostoxin, for which necessary precautions will be taken, it has been determined that Phase II of the MIDAS Project promises to increase and sustain the production and earnings of the target small farmers. The potential benefits should outweigh the potential negative impacts on the human environment which have identified. A negative threshold decision is recommended, and an Environmental Assessment or Environmental Impact Statement is not required. (See Annex VII for IEE, and Section IV for condition precedent/covenant).

3.5 Economic Analysis

The economic analysis for MIDAS II was carried out at several levels. First, an analysis was performed on Ghana's current macro-economic situation and its impact on Ghanaians, in particular small farmers (See Annex IV). Second, a cost-benefit analysis was done for the part of MIDAS II with a geographic focus on the Brong-Ahafo Region (See Annex IV). Third, two separate cost-benefit analysis were done for the two parts of MIDAS with nation-wide focuses, seeds and fertilizer (See Annex IV). These analysis are briefly summarized below.

Macro-economic Analysis

The Ghanaian economy has been deteriorating for over a decade. Real per capita GNP has actually declined, and key growth variables such as the savings rate and the tax/GNP ratio have fallen well below 10%. Even more critically, subsidies, price controls, an over-valued exchange rate, and triple digit inflation have distorted market signals to such an extent that production has become less attractive than speculation, and rationing and black markets are a way of life. From 1973 to 1978, real GDP declined by 3.4% annually. The average Ghanaian is thus 18% worse off than he was in 1973.

The key areas through which the macro-economic situation impacts on the MIDAS project are inflation, government subsidies, the interest rates, and the exchange rate. The analysis concludes that the first round effect of inflation have and will likely continue to benefit the small farmers in Ghana, since food price increases have led the consumer price index over the last several years.

The second-round effects of inflation, however, will have adverse impact on MIDAS. Continued high rates of inflation will mean continued negative real interest rates with implications of rapid decapitalization of the MIDAS credit fund. The exchange rate will become even more over-valued with continued inflation than it is now (in the absence of devaluation). The over-valued exchange rates has contributed to declining exports and substantial smuggling, both of which have led to severe shortage of imported and domestically produced goods. These shortages impact on small farmers directly through the effect on farm inputs and transportation, and indirectly by reducing the incentive to earn increased cash income. Government subsidies on farm inputs, particularly fertilizer, contribute to GOG budgetary problems, may encourage smuggling, and may result in uneconomic use of fertilizer.

3.6 Financial Analysis

The grant/loan "mix" definition for Phase II funding of the project is based on the following:

(a) grant resources will fund technical assistance, participant training and the foreign exchange costs of commodities and equipment attributable to the expansion of the project; (b) loan resources will fund the equipment to complete three seed multiplication centers, agricultural production inputs for resale under the small farmer credit program and other equipment.

Costing of the Project

Phase II of the MIDAS Project was costed utilizing a system which relied on actual current cost data provided from Mission files, current catalogs and current purchase orders for commodities, vehicles and equipment placed on behalf of the first phase of the MIDAS Project. Section 4 to this paper (Implementation Arrangements) as well as Annex V (Implementation and Planning) provide a detailed price list of commodities scheduled for purchase under this activity. This illustrative (and its accompanying base prices with appropriate waiver requests) was developed by USAID with the assistance of the REDSO/WA Commodity Management Advisor. Review and approval of the final listings and procurement schedules have to be made by concerned GOG officials at the MIDAS Executive Committee, Ministerial and Project implementation executive levels.

On the basis of the priced list of commodities, as well as estimates for the requirements for participant training, expatriate technical assistance and local costs, a "detailed cost estimate", keyed to realistic procurement (local and offshore) was prepared. Again, these lead time estimates were derived from the USAID files as well as from data provided from the African American Purchasing Center (AAPC) on current orders for Phase I of the MIDAS Project and other development activities in Ghana. Where specific lead time dates could not be developed (e.g., when local TA support costs and other expenses would be incurred) the lead time used was the assumed "mid-point" of such project year (May 31).

The base cost data was then used to make an estimate (for offshore commodity procurement) of the base cost of ocean freight and insurance. Historically, AAPC reports this cost segment average 35% of the ex-factory cost of commodities. Each cost segment shown in the financial tables (Annex VI) were then escalated utilizing the assumed lead times as well as a series of offshore and local monthly inflation estimates. For example, AAPC reports that it takes an average of 3 months to place a firm order for a vehicle from the date of which the Mission issues a PIO/C. Once the order is placed, the price is assumed to be pinned down insofar as inflation is concerned; thus utilizing the project procurement and implementation schedule set forth in it, it was calculated the project Year 1 vehicle orders could be placed on January 31, 1981. Shipment of vehicles from the factory to the port and the issuance of a signed bill of lading is taken as that date when the actual cost of shipping and insurance is determined; thus escalation was computed for shipping on separate date for the commodity involved.

Annex VI to this paper details the assumption and schedules used in this costing formula. The result, it is believed, is as detailed an estimate as possible as to project costs for each major project segment and category. This system is tied directly to the procurement and implementation schedule, and will provide individual project managers a yearly financial budget against which to compare actual costs as incurred and to adjust their allowances for escalation and contingency accordingly.

Financial Viability

The principal financial viability concerns relate to the ability of the GOG to fund estimated future recurring costs associated with project and the financial viability of the ADB credit program contemplated as an important ingredient to this project.

Ongoing Costs. See Annex VI (GOG Contribution) for details. GOG 5 year project support budget is estimated at \$16,300,000 equivalent. There will be an estimated \$100,000 annual recurrent vehicle maintenance component. Thus, the effective GOG total ongoing costs before escalation and contingency are estimated at \$16,800,000 equivalent. Because of the uncertainties as to need and mid-term GOG economic policies, it is not possible at this time to make a realistic comparison and forecast of its 1985 budget versus the estimated recurrent costs of the Phase II project giving effect to escalation and contingency.

Credit Description. MIDAS II project objectives are to increase basic food crop production, net income and welfare of a targeted 43,000 new and existing small farm borrowers in the B/A Region. In order to accomplish this goal, production inputs, marketing, credit and extension services will be provided to these small farm families cultivating 10 acres or less.

The credit component is targeted to provide the annual production and mid-term loan requirements to an estimated 23,000 new small farm borrowers in addition to the 20,000 farm borrowers presently receiving annual operating loans through ADB's Group Association loan program in this region.

The six components of the project that are to provide the production inputs, marketing, credit and extension services are considered as equal in importance to overall project objectives of increased production net income and welfare.

Credit is considered as the accelerator or/catalyst to project success. The remaining project component production inputs will all directly or indirectly depend upon the small farmer's access to capital. Credit will be required to purchase the production inputs that result from the planned small farms research and extension recommendations, training and supervision, marketing, component services and trader loans, fertilizer and improved seeds.

The credit component's major constraint has been Ghana's high annual inflation rate which has caused severe decapitalization of the Working Capital (WC) available to make loans to the farmer by the ADB. It is estimated that complete WC erosion will take place within two years given the present annual rate of inflation. GOG has agreed to periodically replenish the WC. An appropriate CP to this effect will be completed.

Ghana's interest rate policy presently dictates maximum interest rates that may be charged for certain type of loans for all Banks doing business in the country.

The maximum interest rate that may be charged to food crop farm borrowers is 13%. This interest rate (compound monthly) plus loan commitment fees and other bank charges will cover the ADB's cost of capital administrative costs, bad debts^{1/} and 1-3% for accumulation of capital providing that the GOG annually replenishes WC erosion due to domestic inflation. (See Annex III-M for present cost effective interest rate calculations). In order to prevent negative interest rate from developing during the life of the project, a project agreement will require GOG periodically to review their interest rate policy and adjust accordingly to preclude interest rates that will be negative in real terms.

In summary, the major constraint to the small farm credit program is WC erosion due to Ghana's high annual inflation rate. A cost effective interest rate policy should include provision for annual inflation under normal inflationary conditions. However, Ghana's high annual inflation rates precludes including total of the real term inflation as a factor in determining interest rate policy. Without including all the effects of inflation, Ghana's present interest rate policy is cost effective. WC erosion will have to be replenished by the GOG.

^{1/} Including that portion of ADB's present 10% delinquency that will be classified to "collection only" and charged off as an operational expense, canceled or compromised.

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Elimination of the small farmer credit expansion program or its reorganization away from the service of small farmer credit needs to the larger farmer, will eliminate competition of the formal lending with the local money-lender or trader. Excessive interest rates, "other charges" and/or low crop purchase prices to the small farmer from the money-lender/trader will be the end result. It is estimated that 85 percent of Ghana's total food production is by the small-scale farmer who operates with traditional cutlass and hoe.

Cost-Effectiveness Analysis of Ghana's Interest Rate Policy Based
Upon ADB Data and AID ICI Computer Matrix Output

Credit Analysis

The Agricultural Development (ADB) will be the vehicle for the credit component of this project. Its present and future lending rate structure is summarized below.

	<u>ADB 1979 Actual Rates</u>	<u>ADB 1980/81 Rates</u>
Annual interest rate (compounded monthly)	13.74%	15.97%
Commitment fees	5.76	6.25
Other borrower charges	<u>1.87</u>	<u>1.87</u>
Total effective rate:	21.39%	24.09%

Utilizing an A.I.D. Intermediate Credit Institution (ICI) computer model, an analysis was undertaken utilizing available ADB data to determine the adequacy of current and future ADB fees and charges. This model is designed to furnish the user with a minimum, or breakeven, interest rate which must be charged to maintain the integrity of the loan fund.

The ICI computer model was used to examine various cost variances insofar as bad debt and delinquency rates were concerned. The ADB bad debt assumptions were based on an analysis of what actual accounting data ADB was able to provide as well as on field visits, etc. Bad debt losses (debts not recovered within one year after maturity), were found to vary between 5% and 10% of total loan volume, while delinquency rates (loans repaid within one year after maturity) were estimated at between 5% and 15% of loan volume. The cost of capital employed is approximately 3.0% while administrative costs in 1979 averaged 8.0%. Utilizing these rates a number of "cases" were developed for input into the ICI computer model. The model then furnished for each case, that minimum interest rate which should be charged to the small farmer to maintain the integrity of the fund (before the impact of inflation).

	<u>Case 1</u>	<u>Case 2</u>	<u>Case 3</u>
Cost of capital:	3	3	3
Administrative cost:	8	8	8
Bad debt loss:	10	5	15
Delinquency:	5	5	15
Interest Rate Required:	-23.3	-17.3	+30.02

Based on the above options, it is found that the range of differential interest rates (1980/81 ADB charges subtracted from the minimum rate indicated by the ICI model above) will range from approximately $\pm 6\%$. This rate of subsidization is deemed acceptable, given the uncertainties as to the ADB accounting data; the GOG's willingness to enter into a replenishment agreement; and the political sensitivities attached to further increasing effective charges to the small farmer at this time. The degree of replenishment necessary will vary according to prevailing rates of inflation in the future.

General Rural Credit Component Financial
Analysis Information

- 1) Estimated interest rate charged by money-lenders varies between 50-75 percent with some rates exceeding 100%, (real terms).
- 2) Interest rates charged by commercial banks are: 18-1/2% for commercial and industrial loans and 15-16% for agricultural loans: (Ghana Commercial Bank, Barclays and Standard Bank (Ghana) Limited).
 - (2-1) Interest rates charged by ADB, (See Annex II)

Overdrafts	- 18-1/2%
Agriculture Business	- 16-17%
Fishing	- 13-16%
Industrial Crops	- 14-16%
Food crops and livestock	- 13%
 - (2-2) Commercial Banks are allowed some increase in interest rates over government-owned/controlled banks because of increased opportunity cost of Working Capital. (This does not apply to ADB).
 - (2-3) ADB charges a loan commitment fee that varies from 1% of a 0 - ₵5,000 loan to 2.3% for a 90,001 to ₵100,000 loan. (See Annex II).
- 3) Loan Terms:
 - (3-1) Short-term - 0-1% mo. (87% loans approved for 1978)
 - (3-2) Mid-term - 1-1/2-5 yrs. (10% loans approved for 1978)
 - (3-3) Long-term - 5-10 years (3% loans approved for 1978).
- 4) Overhead costs of the ADB amounted to ₵17,113,691 or 8.6% based upon a total of ₵148,193,150 loan in 1979. This compares to 9.28% 1978 and 12.62, 1977.

The above percentages do not represent cost of capital subsidized by GOG, 1.5% allowance for bad debts, allowance for funds not on loan, inflation rate or accumulation of capital.
- 5) Estimated rate of default for the entire ADB borrower caseload is 30-35%. Group Scheme loans made to small farm borrowers in the 1979 season indicated a 10.08% delinquency rate. Results of 1979 collections have not been tabulated as 60% of the food crop loans made for the 1979 crop season were collected between January 1, and April 1, 1980.

PART 4 - IMPLEMENTATION ARRANGEMENTS

4.1 Implementation Plan

The project strategy remains the same in Phase II. The geographic area of focus is changed from national to the Brong-Ahafo Region, giving special initial attention to (1) Atebubu District, capitalizing on a substantial base of knowledge, experience, and institutions already located there, and (2) ~~the~~ select districts in the region for accelerated extension/demonstration with subsequent expansion throughout the entire region.

The core administrative, coordinating and decision making body for GOG is the MPEC. However with the shift of major focus of Phase II to the Brong-Ahafo Region MPEC-B/A is being established with Project Coordinators at the regional and district levels to coordinate implementation. The Ministry of Agriculture provides the primary implementation resources for the project to the MPEC.

MPEC-B/A will be established in the Brong-Ahafo Region to coordinate project field activities. District Councils will function as sub-committees with the District Agricultural Coordinators serving in the capacity of sub-committee coordinators to coordinate activities with MPEC-B/A.

4.2 Procurement Procedures

The selection of consultants and contractors, procurement of equipment and materials, shipping and insuring will be carried out in accordance with AID standard procedures and regulations. As was the case with Phase I, MPEC will utilize the services of Africar American Purchasing Center (AAPC), New York, as its procurement services agent (PSA) for offshore commodities provided under the project. All procurement shall be subject to USAID approval and in accordance with AID Regulation I practices. (See Part I for waivers required).

Appropriate reports will be obtained concerning procurement requirements and source/origin. The GOG has requested that 50% of the commodities be shipped on Ghana's Black Star Line. These reports and requirements will be monitored by the Capital Project Development and Controller's offices through review of vouchers and supporting documentation submitted in substantiation of reimbursement requests.

4.3 Disbursement Procedures

The PACD for the project is September 30, 1985. The selection of technical assistance advisors, contractors, participant trainees, procurement of equipment and vehicles, shipping and insurance will be performed in accordance with AID regulations to be set forth in the Loan and Project Agreements. Materials and equipment purchased in the U.S. and Code 941 countries will be procured through the standard procedures of either an AID Letter of Commitment or direct disbursement.

No elements of the loan are appropriate for the fixed amount reimbursement (FAR) method.

4.4 A. Conditions Precedent to Initial Disbursement

Prior to any disbursement or the issuance of any commitment documents under the Project Agreements, the cooperating country shall furnish in form and substance satisfactory to A.I.D.:

1. For the Loan only: An opinion of counsel, acceptable to AID, that the Loan Agreement has been duly authorized and/or ratified by and executed on behalf of the cooperating country and constitutes a valid and legally binding obligation of the cooperating country in accordance with all its terms;

2. For the Loan and Grant: (a) A statement of the name of the person acting as authorized representative of the Cooperating Country, and the names of any additional representatives, together with the specimen signatures of each such authorized representative. (b) A detailed Implementation Plan acceptable to AID outlining the cooperating country's administrative and operational arrangements for the first year of project operations and guidelines of any implementation plan for the second year of project operations.

3. Conditions Precedent to Disbursement Under the Loan for Commodities for Resale in Ghana

Prior to any disbursement, or the issuance of any commitment documents under the Loan Agreement to finance commodities for resale in Ghana the borrower will furnish in form and substance satisfactory to AID:

(a) evidence that all advance working capital monies due the Agricultural Development Bank (ADB) pursuant to the terms of the MIDAS I Project Agreements have been deposited to the ADB Working Capital account.

(b) evidence that the cooperating country has deposited or caused to be deposited to the ADB MIDAS Account, the cedi equivalent of the CIF dollar value of the commodities to be procured under the loan. (c) evidence that the selling prices of imported commodities sold to end-users are set by the cooperating country, to reflect the true market value of the commodity in Ghana, as mutually agreed by AID and the cooperating country.

4. Condition Precedent to Disbursement Under the Loan for Seed Processing Equipment

Prior to any disbursement, or the issuance of any commitment documents under the Project Loan Agreement to finance Seed Processing Equipment, the cooperating country shall furnish in form and substance satisfactory to AID:

(a) evidence that the two seed processing units at Winneba and Kumasi are operating successfully.

(b) evidence that physical facilities will be available to house the equipment to be ordered. (c) evidence that a maintenance plan is in effect for the care and upkeep of the equipment.

5. Condition Precedent to Disbursement Under the Grant for Technical Assistance for Fertilizer Systems Development

Prior to any disbursement, or the issuance of any commitment documents under the Project Grant Agreement to finance technical assistance for Fertilizer Systems Development, the cooperating country shall furnish in form and substance satisfactory to AID, evidence that the Ghana Fertilizer Company is operational in a manner satisfactory to AID.

6. Condition Precedent to Disbursement Under the Loan for Procurement of Pesticides

Prior to any disbursement, the issuance of any commitment documents under the Project Loan Agreement to finance the procurement of pesticides, the cooperating country shall furnish, in form and substance satisfactory to AID evidence that personnel trained to a level acceptable to AID in the safe use and handling of pesticides are available and have been designated to work on the project, and that arrangements have been made to ensure that use of the pesticide Phostoxin in the project will be limited to use by or under the direct supervision of such designated trained personnel.

B. Convenants:

1. The cooperating country shall covenant in the Project Grant Agreement that it will ensure or cause to be ensured that personnel trained to a level acceptable to AID in the safe use and handling of pesticides are available and have been designated to work on the project, and that arrangements have been made to ensure that use of pesticides in the project will be limited to use by or under the direct supervision of such designated personnel.

2. The cooperating country shall covenant in the Loan and Grant Agreements that it shall furnish or cause to be furnished to AID, in form and substance satisfactory to AID, not later than March 1, 1981, or such later date as AID may agree to in writing, a study of the source, availability and amounts of funds required to implement the small farmer credit program at the level of effort scheduled under the project. The cooperating country shall further agree to implement, no later than September 1, 1981, or such later date as AID may agree to in writing, the recommendations contained in the study with respect to maintenance of the integrity of the working capital account.

4.5 Evaluation Arrangements

The three-stage evaluation system set forth in Phase I will remain in effect. The systems adopted to assess project efficiency, effectiveness and progress toward achieving project objectives detailed in the logical framework include: (1) Routine Evaluation; (2) Mid-Phase II Evaluation; (3) End of Phase II Evaluation (end of project evaluation).

Phase II evaluation will utilize DERPS and BIRD/UST for on-going monitoring, data collection and assessment. The implementing institutions will prepare quarterly reports and provide other relevant data. MPEC will be responsible for overall assessment/evaluation and will be assisted as required by USAID/Ghana and AID/W staff, and AID-sponsored consultant staff with the mid-Phase II end of Phase II evaluation.

The routine evaluation will include: the implementing institutions/ MPEC quarterly reports; USAID Project Manager's monitoring files/reports; the quarterly and annual project conferences/reviews or progress toward achieving objectives/goals of the annual work plan; baseline data studies and updates measuring project impact; and annual evaluations conducted jointly by GOG and USAID covering such issues as:

- (1) Timeliness and utilization of loan/grant (drawdowns);
- (2) Timeliness and effectiveness of GOG and USAID contributions;
- (3) Timeliness and effectiveness of USAID-supporting technical assistance activities;
- (4) Effectiveness of implementing institutional management, administrative and coordination arrangements (both AID and GOG);
- (5) Extent of local level (small farmer target group) participation in project implementation activities, and project impact on the target group;
- (6) Assessment of individual MIDAS sub-components in terms of compliance with grant and loan lending criteria and effectiveness in implementation.

(a) Funding (\$120,000)

To finance the services of consultants required for the mid-Phase II and final evaluations.

(b) Baseline Data and Monitoring (\$500,000)

Vehicles for DERPS and BIRD and the services of BIRD.

(c) Indicators of Project Impact:

The key indicators of project success have been identified, targeted, and are included in Annexes II and III. In addition, USAID/Ghana and the GOG will target other indicators prior to the signing of the loan/grant agreements, or prior to loan/grant disbursements (e.g., subsidy phase-down on fertilizer and seeds). Other indicators may be formulated before or at the start of project implementation.

(d) Collection and Evaluation of Information on Impact

Data on all key indicators will be collected regularly during the course of project implementation, and build into the activities of each of the major project components.

(e) Evaluation Responsibility

The Phase I MIDAS evaluation highlights the need to associate the responsibility for the entire evaluation process with MIDAS management.

It goes further to suggest the appointment of an evaluation officer within the MPEC Project management organizational structure. Routine evaluation responsibilities included under this element would be:

- (1) Monitor and assist with the preparation of annual plans and quarterly reports;
- (2) Preparation for the MIDAS quarterly review sessions;
- (3) Periodic analysis of institutional progress; and
- (4) Supervision of proposed (target group) surveys.

(f) Content and Methodology

Immediately after authorization of Phase II, a revised survey instrument for accumulating/updating baseline and impact on small farmers in the Brong-Ahafo Region will be developed. The detailed Phase II evaluation design will include the indicators at the goal, purpose and EOPS levels in the economic, financial, social soundness analysis, and supporting technical data used as background for the PP. The evaluation team will spend three to four weeks in Brong-Ahafo at the end of each year. It will consist of such members as: an agriculture economist consultant, a program/evaluation consultant, representatives from the USAID and MPEC, Ghanaian counterparts, and a Ghanaian specialist in design and management of agricultural development programs.

(g) At the Output Level

The evaluation team will review the quarterly reports and other relevant reports/data to determine the extent to which project output targets are met. USAID and MPEC will be responsible for establishing, in advance of the evaluation team's arrival, annual assessment of the status of scheduled project outputs. A series of field visits will enable the team to spot check these results, verifying their quantity and quality. Outputs under each component of the project will be subject to this type of review.

(h) At the Purpose Level

The evaluation will assess institutional performance, i.e. improvement in administrative, managerial and operational structure, and the capacity to produce and deliver inputs and services to the small farmers in Brong-Ahafo, the keys to the achievement of the project's purpose. Field visits to randomly selected small farms, sites of FLOs, extension offices and agents, and regional/national headquarters offices of the implementing institutions will be the main sources of data. Utilizing/analyzing this data the team will evaluate and report on the status of project progress, the level and schedule of target achievement, and project potential for achievement of Phase II objectives. The team will also measure impact on and the degree to which small farmers in Brong-Ahafo Region have been the principal recipients/beneficiaries of project outputs.

(i) At the Goal Level

Signs of increased farm production and income will be identified by comparing baseline income and production data from: the economic analysis in the PP, farm loan applications for the first and subsequent cropping seasons, baseline data updates and monitoring/reviewing appropriate data collected by the marketing, extension/demonstration and research components.

This work will be integrated into an overview reflecting all the evidence of progress against each of the criteria included in the evaluation design. The overview will draw general conclusions regarding the significance to the project objectives of the achievement and failure to achieve the specific targets included in the evaluation design. It will also include recommendations for modifications during Phase II, and revisions in the project design for consideration for funding beyond Phase II.

The evaluation report will be reviewed by the MPEC, DERPS, BIRD and USAID/Ghana who will forward it to AID/W with recommendations and comments.

4.6 USAID Monitoring and Administrative Responsibilities

(a) Project Management: The USAID Food and Agriculture Office (F&A) will continue to have overall responsibility for the management and control of all technical aspects of the MIDAS Project. Close liaison will be maintained with the GOG/MPEC to assure project implementation progress among the various sub-components of the Phase II activity. USAID/F&A will review plans and procedures established for project procurement, contracting, technical assistance, participant training, construction, special studies and other implementation activities funded under the MIDAS project activity. Additionally, USAID/F&A will review all invoices and related documents for USAID loan-financed commodities for resale; and review selection criteria and sub-lending progress of the rural credit institutions. Close contact will also be maintained with the BOC, ADB and FLOs.

The USAID Food and Agriculture Office is expected to have two U.S. direct hire, and one foreign national direct hire officers working full-time monitoring Phase II activities. The Agriculture Development Officer will be the Project Officer and USAID coopted member of MPEC. USAID/F&A will receive the periodic progress reports and results of project reviews, as well as participate with the GOG in joint project evaluations as outlined in Part 4.5.

(b) Financial Management: The Mission Controller will review disbursement/reimbursement requests for conformity with AID regulations and will ensure that adequate financial controls are followed.

(c) Progress Monitoring: The Mission's Capital Development Office and Program Office will coordinate with the Agricultural Development Officer in the implementation of the project and will have responsibility for ensuring that provisions of the Project Loan and Grant Agreement and Implementation Letters are satisfactorily met.

(d) Evaluation: The Evaluation Officer from the Program Office will assist and participate in the joint project evaluations.

(e) REDSO/WA: Staff from the Regional Office in Abidjan will review contract, legal, procurement, engineering and construction documentation, as appropriate.

4.7 Production Input Distribution

Loan funds will finance the importation of \$9,632,000 of production inputs and/or raw materials/equipment for sale to small farmers. Importation of the loan financed commodities will be undertaken as follows:

(1) the demand inputs will be presented (quantified as to amounts and geographic location of subsequent sales, and listed in order of priority) by MPEC, through identification by implementing institutions and trading firms to be based on discussions with market demand of the small farmers.

(2) MPEC will identify and sign agreements with the commercial firms for distribution of inputs financed by the loan. The agreements will cover sales and titles of the commodities to the small farmers; control/security of the commodities in the distribution system to assure the inputs are sold to small farmers in the Brong-Ahafo Region; and the method for setting retail prices.

(3) Cedis in an amount equivalent to 100% of the estimated CIF cost of the goods on shipment will be deposited by GOG to ADB for the small farmer loan program under the Project.

(4) MPEC and USAID will review the list of items to be imported for compliance with the description/type of inputs and terms in the project and loan agreements, prepare specifications and PIO/C's for procurement, and estimate procurement costs. The PIO/C's will be forwarded to AAPC for procurement. USAID will issue the PIO/Cs only after confirmation from ADB that the credit working capital advances have been deposited in ADB's special MIDAS working capital account. (This is discussed below). Based on evidence of deposit USAID will issue the PIO/Cs. The cedi amount due the ADB will be not less than the official dollar/cedi exchange rate in effect at the time the commodities are released from port.

Commodities will be cleared and import duties paid at the port by the authorized commercial firms to whom the shipments were consigned. These firms will have title to the commodities and full responsibility for distribution throughout the Brong-Ahafo Region.

MPEC will be responsible for control and monitoring of the distribution/delivery system and assuring that the commodities reach the intended recipients.

Prior to the commodities being cleared from the port and moving into the distribution system, a list of the amounts to be distributed to each district in Brong-Ahafo Region will be compiled by MPEC and the distributors and publicized.

Locally produced inputs such as seeds will also be channeled through the delivery system. The field staff of all the implementing institutions will assist in the monitoring by reporting the access to, receipt of and prices paid by the farmers for the commodities.

The official retail prices to end-users of the inputs will be set by the GOG. Prices of project goods will more closely reflect true market value for such imported items in Ghana. The prices set will reflect cost differentials in the various locations and include import duties, insurance, CIF price, transportation, handling and dealer margins.

ADB Special Working Capital Account

USAID will issue the PIO/Cs for procurement only after the ADB confirms that the cedi equivalent of 100% of the estimated CIF costs for the goods to be purchased has been deposited as an advance to its account for the credit component of the project. The issuance of the final 20% or about \$2,000,000 of the PIO/Cs will be contingent on confirmation that the cedi deposits due ADB on a current basis have been made.

ADB will set up a special MIDAS small farmer account for the credit facilities/small farms loans in the Brong-Ahafo Region. This will include accounts/records at headquarters and in the credit facilities to record provide data as agreed upon by MPEC, ADB, BOG and USAID.

ADB will assure that prior to receipt of the commodities/inputs by the retail outlets in Brong-Ahafo Region, that the credit facilities in Brong-Ahafo Region have received adequate working capital for making loans to the small farmers for purchasing the commodities/inputs.

Selected outlets will be carefully monitored to insure that commodities get distributed to the end-user target group of small farmers in the Brong-Ahafo Region and to minimize the possibility of improper diversion or resale.

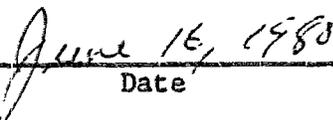
Certification Pursuant to Section 611(e) of the
Foreign Assistance Act of 1961, As Amended

I, Irvin D. Coker, the principal officer of the Agency for International Development in Ghana, having taken into consideration among other factors, the maintenance and utilization of projects in Ghana previously financed or assisted by the United States, do hereby certify that in my judgment Ghana has the technical capability and the physical, financial and human resources to utilize and maintain effectively the proposed project for the development of a managed inputs delivery and agricultural services for small farmer development.

This judgment is based on the facts presented in this Project Paper and the Mission's previous experience with the Ministries of Agriculture, Finance and Economic Planning, as well as experiences with other agencies of the Government of Ghana.



Irvin D. Coker
Director, USAID/Ghana



Date

In case of reply the number and date of this letter should be quoted.

My Ref. No. DV. 24/PR. 3
Your Ref. No. _____



REPUBLIC OF GHANA

MINISTER
MINISTRY OF FINANCE AND ECONOMIC PLANNING
P.O. BOX 1200
ACCRA

16th June, 1980.

Dear Mr. Coker,

REQUEST FOR UNITED STATES ASSISTANCE
TO IMPLEMENT MIDAS II PROJECT

My Ministry and all relevant Ghana Government Institutions have carefully studied the MIDAS II Project Paper together with the conditions precedent to the approval of the Loan and Grant Agreements.

With the amendments mutually made by our team and your team in the MIDAS Project Paper Phase II and the Conditions Precedent Paper, I wish to convey to you our agreement in principle the contents of the documents. I further wish to formally request for United States assistance of about \$31.0 million, made up of about \$15.0 million loan and about \$16.0 million grant, as contained in the Project Paper, to implement MIDAS II.

I am looking forward to the negotiations of the terms of the Agreement on the MIDAS II project and also assure you in advance that the counterpart and recurrent cost will continue to be borne by the Government of Ghana.

Once again, I wish to underline the policy of the Government of Ghana of assisting the small and poor farmer to improve his living standard. It is within this framework that we attach great significance to MIDAS II which is oriented towards improving the lot of the small farmers in Brong Ahafo Region.

I will greatly appreciate your Government's assistance in the implementation of MIDAS II this year.

Yours sincerely,

MINISTER OF FINANCE AND ECONOMIC
PLANNING
(DR. AMON NIKOI)

MR. IRVIN COKER,
DIRECTOR,
U. S. AID MISSION,
ACCRA.

5C(1) - COUNTRY CHECKLIST

Listed Below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Economic Support Fund.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights?

Yes. All AID Projects in Ghana support activities aimed at the poor majority.

2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?

No. The Government of Ghana is cooperating with U.S. and International Agencies in the control of illicit drugs and narcotics traffic.

3. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?

Yes, it has been so determined.

4. FAA Sec. 620(c). If assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods

The Government of Ghana is not known to be indebted under any of these circumstances to any U.S. Citizen for goods and services furnished or ordered.

or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?

5. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) ~~taken any action~~ which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? No.
6. FAA Sec. 620 (a), 620 (f); FY 79 App. Act Sec. 108, 114 and 606. Is recipient country a Communist country? Will assistance be provided to the Socialist Republic of Vietnam, Cambodia, Laos, Cuba, Uganda, Mozambique, or Angola? No.
7. FAA Sec. 620 (i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? No.
8. FAA Sec. 620 (j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? Adequate measures have been taken to protect U.S. property.
9. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility of confiscation, has the AID U.S. Ghana agreement relating to investment guarantees entered into force March 3, 1967.

Administrator within the past year considered denying assistance to such government for this reason?

10. FAA Sec. 620(o); Fishermen's Protective Act of 1967, as amended, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters,

No seizures have been made.

- a. has any deduction required by the Fishermen's Protective Act been made?
- b. has complete denial of assistance been considered by AID Administrator?

11. FAA Sec. 620; FY 79 App. Act Sec. 603.
(a) Is the government of the recipient country in default for more than six months on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds?

(a) No.
(b) No

12. FAA Sec. 620(s). If contemplated assistance is development loan or from Economic Support Fund, has the Administrator taken into account the percentage of the country's budget which is for military expenditures, the amount of foreign exchange spent on military equipment and the amount spent for the purchase of sophisticated weapons systems? (An affirmative answer may refer to the record of the annual "Taking Into Consideration" memo: "Yes, as reported in annual report on implementation of Sec. 620(s)."
This report is prepared at time of approval by the Administrator of the Operational Year Budget can be

N/A

the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

13. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? No.
14. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? Ghana is not delinquent with respect to dues, or other obligations to the U.N. for the purposes of Article 19 of the Charter.
15. FAA Sec. 620A, FY 79 App. Act, Sec. 607. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism? No.
16. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA? No.
17. FAA Sec. 669, 670. Has the country, after August 3, 1977, delivered or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards? Has it detonated a nuclear device after August 3, 1977, although not a "nuclear-weapon State" under the nonproliferation treaty? No to Both items.

3. FUNDING CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria:

a. FAA Sec. 102(b) (4). Have criteria been established and taken into account to assess commitment progress of country in effectively involving the poor in development, on such indexes as: (1) increase in agricultural productivity through small-farm labor intensive agriculture, (2) reduced infant mortality, (3) control of population growth, (4) equality of income distribution, (5) reduction of unemployment, and (6) increased literacy. Yes.

b. FAA Sec. 104(d) (1). If appropriate, is this development (including Sahel) activity designed to build motivation for smaller families through modification of economic and social conditions supportive of the ~~desire~~ for large families in programs such as education in and out of school, nutrition, disease control, maternal and child health services, agricultural production, rural development, and assistance to urban poor? Yes.

2. Economic Support Fund Country Criteria:

a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? N/A

b. FAA Sec. 533(b). Will assistance under the Southern Africa program be provided to Mozambique, Angola, Tanzania, or Zambia? If so, has President determined (and reported to the Congress) that such assistance will further U.S. foreign policy interests? 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

- d. FY 79 App. Act Sec. 113. Will assistance be provided for the purpose of aiding directly the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights? N/A

- e. FAA Sec. 620B. Will security supporting assistance be furnished to Argentina after September 30, 1978? N/A

SC(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual fund sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Economic Support Fund.

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

A. GENERAL CRITERIA FOR PROJECT

1. FY 79 App. Act Unnumbered; Faa Sec. 653(b); Sec. 634A. (a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure)?
Project was included in FY 1979 and 1980 Congressional Presentations.
2. FAA Sec. 611(a) (1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?
Yes.
3. FAA Sec. 611(a) (2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?
No further legislative action is required.
4. FAA Sec. 611(b); FY 79 App. Act Sec. 10). If for water or water-related land resource construction, has project met the standards and criteria as per the Principles and Standards for Planning Water and
N/A.

Related Land Resources dated
October 25, 1973?

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?

N/A

Sec. 209. Is project susceptible of 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.

The project cannot be executed as part of a regional project since it is designed to strengthen the Agricultural Inputs Delivery systems wholly within Ghana.

7. FAA Sec. 601(a). Information and conclusions whether project 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 conclusion 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).

It is anticipated that a portion of the technical assistance and most of the equipment for the project will be procured from U.S. private sector sources.

9. FAA Sec. 612(b); Sec. 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 to meet the cost of contractual and other services.

The Project Agreement provides from contributions by the GCG to meet contractual and other services costs.

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. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Yes.

12. FY 79 App. Act Sec. 608. 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.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project
Criteria

a. FAA Sec. 102(b); 111; 113;
281a. Extent to which activity will (a) effectively involve the poor in development

The projects central focus seeks to promote the participation of the rural poor in the benefits of development through a range of policy and institutional mechanisms with AID assistance.

by extending access to economy at local level, increasing labor-intensive production and the use appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward 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?

Several elements of the project promote the status and participation of women in economic activities.

- b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: (include only applicable paragraph which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source).

(1) (103) for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; (103A) if for agricultural research, is full account taken of needs of small farmers;

Yes. The development of an integrated delivery system for Agricultural inputs and services will increase rural productivity and incomes.

(2) (104) for population planning under sec. 104(b) or health under sec. 104(c); if so, extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems and other modes of community research.

N/A

(3) (105) for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;

N/A

(4) (106) for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is:

N/A

(i) Technical cooperation and development, especially with U.S. private and voluntary, or regional and international development organizations;

N/A

(ii) to help alleviate energy problems;

N/A

(iii) research into, and evaluation of, economic development processes and techniques;

N/A

- (iv) reconstruction after natural or manmade disaster: N/A
- (v) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance: N/A
- (vi) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development. N/A
- c. (107) is appropriate effort placed on use of appropriate technology? Yes. The project will utilize appropriate technology.
- d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)? The GOC will provide at least 25% of the projects' costs, and such contribution will be reflected in the Project Agreement.
- e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? N/A.
- f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes All of the project's activities will draw upon Ghanaian talent to establish, improve or expand institutional mechanisms, supportive of agricultural development objectives bearing on the small farm family.

the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental and political processes essential to self-government.

- g. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

The project will establish a stronger basis for securing greater utilization of production factors in the agricultural sector.

2. Development Assistance Project Criteria (Loans Only)

- a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.

It is reasonably certain that the GOG will be able to repay the loan. The proposed loan is legal under Ghanaian law and the proposed terms are reasonable for Ghana.

- b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

N/A.

3. Project Criteria Solely for Economic Support Fund

- a. FAA Sec. 531(a). Will this assistance support promote economic or political stability?

To the extent possible, does it reflect the policy directions of section 107?

N/A.

- b. FAA Sec. 533. Will assistance under this chapter be used for military, or paramilitary activities?

N/A.

5C(3) - STANDARD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed? The standard procedures for facilitating small business participation in AID financed procurement will be followed.

2. FAA Sec. 604(a). Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him? Yes.

3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed? Yes.

4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? N /A

5. FAA Sec. 608(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items? This will be a requirement of the Project Agreement.

6. FAA Sec. 601. (a) Compliance with requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.

The Project Agreement will so require.

7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

Technical assistance will be furnished primarily from private sources on a contract basis.

8. International Air Transport Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available?

Yes.

9. FY 79 App. Act. Sec. 105. Does the contract for procurement contain a provision authorizing the termination of such contract for the convenience of the United States?

Yes.

3. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest? N/A.
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable? Yes.
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million? N/A.

C. Other Restrictions

1. FAA Sec. 122(e). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter? Yes.
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? N/A
3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-bloc countries, contrary to the best interests of the U.S.? Yes. The Project Agreement will so specify and the GOG is aware of the restriction.

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S., or guaranty of such transaction? Yes.

5. Will arrangements preclude use of financing: |

a. FAA Sec. 104(f). To pay for performance of abortions or to motivate or coerce persons to practice abortions, to pay for performance of involuntary sterilization, or to coerce or provide financial incentive to any person to undergo sterilization? |

b. FAA Sec. 620(g). To compensate owners for expropriated nationalized property? |

c. FAA Sec. 660. To finance police training or other law enforcement assistance, except for narcotics programs? |

d. FAA Sec. 662. For CIA activities? |

e. FY 79 App. Act Sec. 104. To pay pensions, etc., for military personnel? |

f. FY 79 App. Act Sec. 106. To pay U.N. assessments? |

g. FY 79 App. Act Sec. 107. To carry out provisions of FAA sections 209(d) and 251(h)? (Transfer of FAA funds to multilateral organizations for lending). |

The Project Agreement will provide for specific use of AID funds for agreed upon purposes and thus preclude allocation of such funds for the purposes covered by the legislation cited in items 5a through 5i.

- h. FY 79 App. Act Sec. 112.
To finance the export of nuclear equipment, fuel, or technology or to train foreign nations in nuclear fields?
 - i. FY 79 App. Act Sec. 601.
To be used for publicity on propaganda purposes within U.S. not authorized by the Congress?
- The Project Agreement will provide for specific use of AID funds for agreed upon purposes and thus preclude allocation of such funds for the purposes covered by the Legislation cited in items 5a through 5i.

(b) Source and Origin of Goods and Services

Goods and services, except for ocean shipping, financed by A.I.D. under the Loan shall have their source and origin in Ghana or in countries included in A.I.D. Geographic Code 941 except as A.I.D. may otherwise agree in writing. Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in Ghana or in the United States.

Ocean shipping financed by A.I.D. under the Loan shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of United States or Ghana. Ocean shipping financed by A.I.D. under the Grant shall, except as A.I.D. may otherwise agree in writing be financed only on flag vessels of the United States.

(c) Conditions Precedent to Initial Disbursement

Prior to any disbursement or the issuance of any commitment documents under the Project Agreements, the Cooperating Country shall furnish in form and substance satisfactory to A.I.D.:

1. For the Loan only:

An opinion of Counsel, acceptable to A.I.D., that the Loan Agreement has been duly authorized and/or ratified by and executed on behalf of the cooperating country and constitutes a valid and legally binding obligation of the cooperating country in accordance with all its terms;

2. For the Loan and Grant:

(a) A statement of the name of the person acting as authorized representative of the Cooperating Country, and the names of any additional representative, together with specimen signatures of each such authorized representative.

(b) A detailed Implementation Plan acceptable to A.I.D. outlining the cooperating country's administrative and operational arrangements for the first year of project operations and guidelines of an implementation plan for the second year of project operations.

(d) Conditions Precedent to Disbursement Under the Loan for Commodities for Resale in Ghana

Prior to any disbursement, or the issuance of any commitment documents under the Loan Agreement to finance commodities for resale in Ghana the borrower will furnish in form and substance satisfactory to A.I.D.:

(1) evidence that all advance working capital monies due the Agricultural Development Bank (ADB) pursuant to the terms of the MIDAS I Project agreements

have been deposited to the ADB Working Capital Account.

(2) evidence that the cooperating country has deposited or caused to be deposited to the ADB MIDAS Account, the cedi equivalent of the CIF dollar value of the commodities to be procured under the Loan.

(3) evidence that the selling prices of imported commodities sold to end-users are set by the Cooperating Country to reflect the true market value of the commodity in Ghana, as mutually agreed by A.I.D. and the Cooperating Country.

(e) Condition Precedent to Disbursement Under the Loan for Seed Processing Equipment

Prior to any disbursement, or the issuance of any commitment documents under the Project Loan Agreement to finance Seed Processing Equipment, the Cooperating Country shall furnish in form and substance satisfactory to A.I.D.:

- (1) evidence that the two seed processing units at Winneba and Kumasi are operating successfully;
- (2) evidence that physical facilities will be available to house the equipment to be ordered;
- (3) evidence that a maintenance plan is in effect for the care and upkeep of the equipment.

(f) Condition Precedent to Disbursement Under the Grant for Technical Assistance for Fertilizer Systems Development

Prior to any disbursement, or the issuance of any commitment documents under the Project Grant Agreement to finance technical assistance for Fertilizer Systems Development, the Cooperating Country shall furnish in form and substance satisfactory to A.I.D., evidence that the Ghana Fertilizer Company is operational in a manner satisfactory to A.I.D.

(g) Condition Precedent to Disbursement Under the Loan for Procurement of Pesticides

Prior to any disbursement, the issuance of any commitment documents under the Project Loan Agreement to finance the procurement to Pesticides, the Cooperating Country shall furnish, in form and substance satisfactory to A.I.D. evidence that personnel trained to a level acceptable to A.I.D. in the safe use and handling of pesticides are available and have been designated to work on the project, and that arrangements have been made to ensure that use of the pesticide Phostoxin in the project will be limited to use by or under the direct supervision of such designated trained personnel.

(h) Convenants:

The Cooperating Country shall covenant in the Project Grant Agreement that it will ensure or cause to be ensured that personnel trained to a level acceptable to A.I.D. in the safe use and handling of pesticides are available and have been designated to work on the project, and that arrangements have been made to ensure that use of pesticides in the project will be limited to use by or under the direct supervision of such designated personnel.

(2) The Cooperating Country shall covenant in the Loan and Grant Agreements that it shall furnish or cause to be furnished to A.I.D., in form and substance satisfactory to A.I.D., not later than March 1, 1981, or such later date as A.I.D. may agree to in writing, a study of the source, availability and amounts of funds required to implement the small farmer credit program at the level of effort scheduled under the project. The Cooperating Country shall further agree to implement, no later than September 1, 1981, or such later date as A.I.D. may agree to in writing, the recommendations contained in the study with respect to maintenance of the integrity of the working capital account.

(i) The following waivers to A.I.D. regulations are hereby approved:

Waiver Requirements (Loan)

(a) A proprietary procurement waiver in the amount of \$679,000 for seed processing, drying and conditioned storage equipment and farm machinery is required for the Ghana Seed Company. This is essential to assure standardization and/or compatibility with equipment procured from the U.S. during Phase I of project 641-0067.

(b) A source/origin waiver Code 935 in the amount of \$534,000 is required to procure electrical materials/equipment from England compatible with Ghana's electrical code and systems.

Waiver Requirements (Grant)

(a) A source/origin waiver Code 935 in the amount of \$33,000 for procurement of manual typewriters from Brazil. Manual typewriters are no longer made in the U.S.

(b) A source/origin to Code 935, a FAA Section 636(i) and proprietary procurement waiver in the amount of \$244,000 for procurement of Honda motorcycles from Japan and spare parts, compatible with those procured during Phase I. Motorcycles of the size and type required for the project are not manufactured in the U.S.

(c) A commodity procurement origin waiver in the amount of \$200,000 for shelf item procurement of minor spare parts (fuses, batteries, tires, etc.) and construction materials that are in very limited supply in Ghana from neighboring countries.

(d) A proprietary procurement waiver in the amount of \$421,000 for farm machinery is required for the Ghana Seed Company. This is essential to assure standardization and/or compatibility with equipment procured from the U.S. during Phase I of the MIDAS Project (641-0067).

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Clearances

- A.
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Signature _____

Typed Name of Authorizing Officer

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NARRATIVE SUMMARY	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFIABLE INDICATORS	IMPORTANT ASSUMPTIONS
<p>PROGRAM PURPOSE</p> <p>To establish an efficient and cost-effective institutional structure and delivery system for production inputs, marketing, credit and extension services to serve the needs of small farm families in the Brong-Ahafo Region, while continuing to strengthen those agricultural services' institutions responsible for project implementation.</p>	<p>CONDITIONS THAT WILL INDICATE PURPOSE HAS BEEN ACHIEVED, END-OF-PROJECT STATUS</p> <p>The institutions responsible for producing/delivering production inputs and services are performing their roles, and inputs and services are accessible throughout the region.</p> <p>62,500 small farm families have access to improved seeds, demonstration/research and extension information, appropriate technology processes and equipment, insecticides/pesticides and/or credit and improved marketing services.</p> <p>The improved marketing services are being provided in the Atebubu District and possibly replicated in other districts.</p> <p>The implementing institutions and the distribution delivery systems performance levels are making inputs and services available and accessible to the small farmers in/at the proper time, place and quantity.</p> <p>Increased number of and improved quality of trained professionals working in Brong-Ahafo.</p> <p>ADB has a strong regional program in Brong-Ahafo and is lending to 43,000 target families by 1985.</p>	<p>Records from ADB's Management Information System and from BOG's Rural Banks Department records regarding the number of farmers reached and the uses of credit provided.</p> <p>MOA Extension records indicating the extent and regularity of services provided in these regions.</p> <p>Surveys, interviews with farmers and project evaluations indicating the extent to which they had regular access to inputs and services.</p> <p>Records of the implementing institutions and the distribution/delivery system indicating the increase in production inputs sales to small farmers in the region.</p> <p>GOC records and project progress reports.</p> <p>ADB records and project progress reports.</p>	<p>ASSUMPTIONS FOR ACHIEVING PURPOSE</p> <p>That policies are pursued which encouraged greater private sector participation in input distribution</p> <p>The concerned GOC agencies will coordinate and implement their annual work programs to assure that requisite services' programs are designed and implemented to guide/assist small farmers increase production and incomes utilizing the inputs and services.</p> <p>The concerned institutions will strengthen their capacities to provide adequate inputs to the delivery system. The MPEC and the implementing institutions, supported by appropriate GOC policies and actions will achieve effective integration/coordination of efforts.</p>

NARRATIVE SUMMARY	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>2. To establish an effective Managed Inputs Delivery and Agricultural Services system.</p>	<p>2. The Project Executive Committee achieves its objectives of strengthening and coordinating the implementing institutions' efforts in producing/developing inputs and services;</p> <p>The inputs distribution/delivery system is established through/by private/commercial firms and the credit facilities relieving the MOA Extension/field staff of all delivery services' responsibilities;</p> <p>The distribution/delivery established assures small farmers access to inputs and services.</p> <p>There is an effective system for planning, budgeting and evaluation.</p> <p>MPEC/Sunyani is established, staffed, functioning, and coordinating the field activities of the implementing institutions and the inputs and services are accessible to the small farmers in/at the proper time, place and quantity.</p> <p>Agricultural data and information will be more reliable and accessible to public sector institutions and farmers.</p>	<p>2. MPEC/implementing institutions quarterly reports stating degree of success achieved in delivering inputs and services;</p> <p>Monitoring and evaluation reports on small farmer accessibility to/provision of inputs and services.</p> <p>Annual baseline data updates showing increased accessibility to and utilization of inputs and services and resulting increased production and incomes.</p> <p>observation/reports.</p> <p>GOC Budget Reports.</p>	<p>2. MPEC will function effectively and receive GOC support at all levels to remove bottlenecks.</p> <p>The implementing ministries and institutions will cooperate fully in the delivery system.</p> <p>Policies and actions of GOC will encourage and support the delivery system through private/commercial channels.</p> <p>The Regional and Local Governments (modern and traditional), the ministries, parastatals, private traders, distributors, retailers, and entrepreneurs involve in/concerned with the delivery system will coordinate their efforts and provide support, inputs and services to small farmers.</p> <p>The credit facilities and commercial firms will establish not less than 45 retail outlets in B/A for production inputs.</p>

NARRATIVE SUMMARY	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
PROJECT OUTPUTS	MAGNITUDE OF OUTPUTS		ASSUMPTIONS FOR ACHIEVING OUTPUTS
<p>1. An expanded and improved seed production, and distribution system operating.</p>	<p>1. The GSC becomes effectively operational producing quality foundation seed; procuring quality certified seed through contract growers; processing, storing and distributing certified seeds to small farmers; and established as a viable, profitable commercial firm.</p>	<p>The following means of verification will be used for verifying all the project outputs and the magnitude of the outputs:</p> <p>Site inspection.</p> <p>Quarterly progress reports of implementing agencies.</p> <p>Annual reports by MPEC.</p> <p>Annual project evaluations by the GOG and AID project management.</p> <p>Monitoring reports by BIRD.</p> <p>Interviews and surveys with private traders (particularly those participating in the pilot marketing activity) indicating the extent to which they have increased service to small farmers and condition of the transportation/communication network.</p> <p>Monitoring and baseline data updates showing impact of program on small farmers.</p>	<p>The following assumptions are appropriate for all project outputs:</p> <p>Adequate working capital and/or budget funds are available to the implementing institutions when needed.</p> <p>Adequate human resources are available for training/filling key staff and other positions in all implementing institutions.</p> <p>The GOG fiscal and pricing policies give adequate incentive for increased participation of the private sector in the inputs distribution and product marketing, and for small farmers to purchase/utilize the inputs and services to increase production.</p>

NARRATIVE SUMMARY	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	<ul style="list-style-type: none"> a. effective operation of four foundation seed farms; b. all certified seed produced by contract growers; c. three seed processing plants constructed, equipped and operating in Winneba, Kumasi and Tamale; d. two conditioned seed storage plants at Winneba and Kumasi and one seed storage plant at Tamale; e. an effective seed distribution system involving private commercial firms, private market outlets with not less than 45 outlets in Brong-Ahafo; f. distributing certified seed annually in the following amounts by year 5: <ul style="list-style-type: none"> 1) maize-12,000,000 pounds adequate to plant 600,000 acres; 2) rice-7,200,000 pounds, adequate to plant 102,857 acres; 3) groundnuts-490,000 pounds, adequate to plant 7,000 acres; 4) sorghum-1,800,000 pounds, adequate to plant 1,500,000 acres; 5) vegetables-13,265 pounds, adequate to plant 40,810 acres. 		<p>Adequate local construction/fabrication materials are available.</p> <p>The loan-funded production inputs and private firm/entrepreneur outputs, and other GOC sources will assure an adequate supply of production inputs including small farm entrepreneur equipment, tools and raw materials, and the delivery system will distribute them to small farmers.</p> <p>GOC provides budget for and assigns personnel and equipment to Brong-Ahafo region.</p>

NARRATIVE SUMMARY	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>2. An effective seed inspection and certification program operating.</p> <p>3. An expanded and efficient small farmer credit program operating.</p>	<p>g. seeds sold at between a 10 and 20 percent profit above all production, processing, storage and distribution costs.</p> <p>2. Ghana Seed Inspection Service established and effectively controlling seed quality and certification, independent and autonomous from GSC, inspection and laboratory facilities and trained staff at Accra, Kumasi, Ho and Tamale.</p> <p>3. A small farms credit program in operation satisfying the total annual production and mid-term credit requirements of new and existing small farm borrowers in Brong-Ahafo;</p> <p>a. about 23,000 new small farm borrowers and 20,000 existing borrowers serviced by 1985.</p> <p>b. establishment and effective operation of 5 existing and 10 new credit facilities under ADB, and 1 existing and 7 new facilities under BOG;</p> <p>c. training center providing appropriate training for about 65 credit facilities personnel annually;</p> <p>d. the credit facilities staffed with at least a manager/loan officer supported by an Extension/supervised credit/marketing officer on staff or seconded from the Extension Service.</p>	<p>ADB and project reports.</p>	

NARRATIVE SUMMARY	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>4. A Small Farm Systems Research capability instituted and functioning.</p>	<p>4. One fully staffed, operational small farms research station/facility in Brong-Ahafo:</p> <ul style="list-style-type: none">a. applied small farms research program implemented developing technological/production packages; improved soils management practices; improved farm management/production practices utilizing only inputs and services available and socially/culturally acceptable to, and economically, agronomically, labor resource and environmentally feasible for small farmers; and an extending and feedback system relevant to small farmer constraints/needs;b. research station utilized primarily for new crop variety introduction, adaptability testing and long range soils management investigation;c. all adaptive research tests and trials conducted on plots on or among farmers' fields using only inputs, practices and services within the small farmers' levels of access, technical/management capability and means of acquisition.		

NARRATIVE SUMMARY	OBJECTIVE VERIFIABLE INDICATORS	MEANS OF VERIFICATIONS	IMPORTANT ASSUMPTIONS
<p>5. An improved understanding of the structure and functioning of the food crop marketing system in Atebubu District, B/A Region has identified alternative improvements/approaches to traditional marketing channels resulting in effective, efficient farm gate marketing program, appropriate for replication to other areas.</p>	<p>5. Pilot marketing program has tested and identified interventions to resolve constraints to effective farm gate marketing, and is implementing a program designed to establish an effective, efficient farm gate marketing system:</p> <ul style="list-style-type: none">a. not less than 90 market traders receiving working capital loans at commercial terms from ADB;b. a market transportation service center/workshop effectively maintaining rolling stock in the Atebubu District marketing system;c. market place facilities improvements completed in Atebubu District markets resulting in increased efficiency of bulking/marketing of produce, improved farm gate marketing services, and more equitable market terms/conditions for small farmers and market traders.		

NARRATIVE	OBJECTIVE VERIFIABLE	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>6. An improved capability of the Farm/Home Extension Services to demonstrate to and convince large farmers of small farmers/farm families in the Brong-Ahafo Region of the profitability of adopting improved farm management/production, on-farm storage, home management, and marketing practices and utilizing production inputs and services.</p>	<p>6. Extension Service effectively performing the two-way communication role between the implementing institutions responsible for inputs and services and the small farmers:</p> <ul style="list-style-type: none"> a. Extension Service appropriately interpreting research findings and other relevant data, and extending it in understandable form to small farmers through trial/result demonstrations, group meetings, farm visits, etc; b. minimum of 300 improved management production practices/inputs trials per year on farmers' fields in Brong-Ahafo; c. operation of a training and support unit for Extension in B/A; d. establishment and operation of 5 new farm home demonstration centers by the H EU; 		<p>Community leaders available and willing to work with Extension Service.</p>

PROJECT OUTPUTS	MAGNITUDE OF OUTPUTS	MEANS OF VERIFICATION	ASSUMPTIONS FOR ACHIEVING OUTPUTS
<p>1. An efficient fertilizer procurement and distribution system operating.</p> <p>2. Closer and more effective coordination between private and public institutions serving the agricultural sector.</p> <p>3. Improved GOC capability to construct and maintain a market transportation network and feeder roads etc., in the Brong-Ahafo Region.</p>	<p>e. improvements in small farm families' nutrition, sanitation, health and home management resulting from the efforts of the HEU. Increased attention to women farmers, farm laborers, home-makers and access by them to inputs and service, resulting in increased productivity, incomes, welfare and general well-being for women.</p> <p>1. GFC established and operational procuring and distributing fertilizer, and a viable profitable commercial firm:</p> <ul style="list-style-type: none"> a) an advance procurement plan developed and implemented to assure procurement of fertilizer scheduled to coordinate with planting seasons; b) a procurement schedule designed to avoid ordering during peak demand seasons in manufacturing countries when prices are at their highest levels; c) an effective distribution system involving private/commercial firms, market outlets with not less than 45 outlets in Brong-Ahafo. <p>2. Farmers receiving inputs and services in a timely manner.</p> <p>3. Feeder/farm access roads and secondary roads are constructed and/or maintained--improving farm gate marketing operations.</p>		

ANNEX III-A

DESCRIPTION OF THE BRONG-AHAFO REGION

General

The Brong-Ahafo Region encompasses a total land area of 25,000 square miles, of which 1,625 square miles are covered by Lake Volta, and 1,500 square miles are set aside for the Degya National Park. The vegetation varies from closed forest to sparse, scattered savannah trees, shrubs and grass. There are three distinct ecological/vegetation zones: one-third forest, one-sixth derived savannah (transition zone between the forest and savannah); and one-half Guinea savannah. The Region requires an improved road system, existing and new, to realize its potential for food crop and timber exploitation.

The Atebubu area and much of the balance of the savannah have considerable immigration potential, once opened up. The sandy soils, however, require careful management with fertility improving practices and crops and well designed rotations. With careful application of soil management, and the growing of adapted crops and varieties, this area can develop into a main producer of annual crops such as maize, cotton, groundnuts, and yams. Introduction of ox cultivation, so far not practiced, would provide greater scope for productivity and improvement and might lead towards integrated livestock farming in this area, as well as the Wenchi plateau adjoining it to the east.

The 1980 population is estimated at 1,000,000. Urban population in the 24 towns varies from 50,000 in the regional capital, Sunyani, to 7,000 in the smaller District capitals and larger villages, totalling about 304,000 people. There are about 696,000 rural inhabitants at an average population density of 13 per square mile varying from 31 in the transition zone to 8 in the savannah.

It is estimated that 90 percent of the rural population engage in farming with the balance in processing, fishing, trading, marketing, honey gatherers, etc. Of the total labor force of 423,000 there are 310,000 in the agriculture labor force. The rural households/farm families number about 87,000 averaging 8 members with 4.8 labor units cultivating 3-4 acres having about .8 labor units per acre. The farms vary in size from a few larger mechanized farms to small subsistence holdings.

The land use concentration and population density varies a great deal. The western half of the Region, forest and transition zones, has the highest population density, but varies from heavily to sparsely populated pockets. The heaviest population is along the road from Sunyani to Tamale in the Techiman-Kintampo and Zizigre areas. The land use, and population in the savannah is scattered and at a much lower density than in the transition zone. The main areas of population in

the savannah are along the Ejura to Yeji road and the Atebubu to Kwame Danso road.

The land resources are surplus to the needs of the current inhabitants. The traditional slash and burn, shifting cultivation is generally practiced. Production per worker compares well with most other areas. The soils generally are somewhat fragile in their chemical and physical balance and misuse will likely lead to degradation. Improved management systems are required. There is no evidence that the existing research institutes are working on this problem.

Historically, production increases have been realized through expanded acreage being cultivated. The focus must be shifted to increasing farmer access to production inputs and services, improved management and intensification of production rather than area expansion, and improved storage, marketing and related incentives.

Soils and Topography

The land is generally undulating, the relief varying gradually from about 290 feet in Atebubu agricultural district to 325 feet in the Sunyani area. About 2 percent of the area is covered by rocky outcroppings, and 5 percent by soils covered hills rising between 500-1000 feet in the Sunyani District.

Soils reconnaissance surveys have been completed except for parts of the Wenchi, Kintampo and Atebubu Districts. The soils have shared attributes: acidity in the subsoils; tendency to lose organic matter and nitrogen once cleared for cultivation; fairly high subsoil clay content with low activity and plant nutrient holding power; and absence of a water table in upper part of the crop root zone for part of each year, except in some of the valley bottoms.

The forest zone soils generally are higher in humus and nitrogen content and are suitable for cocoa and other tree crops and most food crops. The savannah Ochrosols soils exhibit similarities of being shallow, containing hard secondary iron-oxide (latrites), to being rocky, and are droughty during the dry season. The lower or valley bottom finer textured soils are subject to seasonal water logging during the rainy season. The transition zone contains more soils with medium texture, fairly high water holding capacity with good internal drainage, and moderate supplies of plant nutrients than elsewhere in the region.

The total land area, good arable land area, and fair to marginal land areas in thousands of acres are shown in the table below, broken down between populous and empty areas.

Populous Areas				Empty Areas		
total	good	Cultivated and fallows ¹	fair to marginal	total	good	fair to marginal
13,937	4,643	5,975	9,294	5,185	1,000	4,185

There are three major soil groups in the Region, namely, Forest Ochrosols, Savannah Ochrosols, and Laterite-Ochrosols Integrades.

The Forest Ochrosols are relatively well drained soils with accumulation of organic matter in the surface horizon resulting from the more abundant leaf-fall and the slower rate at which humus is oxidized under forest vegetation. Ochrosols are easily tilled, friable and offer freedom of root development, and under natural conditions contain adequate amounts of plant nutrients.

Savannah Ochrosols are moderately well drained and friable, contain less than 2 percent organic matter and are generally low in nutrients with phosphorous and nitrogen being particularly deficient.

The Laterite Ochrosol Integrades are poorly drained, become water logged in the lower part of the profile, and are droughty during dry spells.

The forest soils are generally of fair inherent fertility due to the humus layer, and reserves of minerals in the subsoil. They maintain their fertility under the traditional management practices of mixed cropping and a long fallow period. As production is intensified, reducing the length of fallow periods, it is necessary to introduce commercial fertilizers to maintain the fertility level. The savannah soils are of low inherent fertility due to their low organic matter levels and poor phosphate reserves. Under existing systems of management fair levels of fertility are maintained through long fallow periods, however, crops suffer from nitrogen deficiencies. Yields of crops in most areas are economically increased by using commercial fertilizers.

Climate and Rainfall. The temperature varies between 85°F and 77°F with a mean around 81°F. The average annual long term rainfall varies from 59 inches in the forest zone to 53 inches in the savannah with great variations from year to year in any given area. The dry season rainfall from November to March varies from 12 inches in the forest zone to 8 inches in the savannah.

1. Part of the land under cultivation, including fallow land, are rated fair to marginal.

Rivers. The Region is fairly well supplied with streams and rivers. Drainage is generally well developed, except in some lowland areas in the Atebubu District where a poor natural drainage system gives rise to hydromorphic soils. Although considered perennial they flow intermittently during the dry season particularly in the savannah zone.

Very little of the rivers' waters are stored in dams or reservoirs. Virtually no irrigation is practised. Most of the water for domestic use is hand carried from, or piped from holes dug in the river beds, or obtained from boreholes. The potential exists for rainfall catchment ponds for domestic and animal use, and is badly needed in the transition and savannah zones.

Land Tenure

The Land Tenure System in Brong-Ahafo Region is similar to that of the rest of Ghana. The two categories of land ownership are communal and state lands. The ownership of communal lands is vested in the stool or traditional chief of the community. The central government owns the state lands which generally were formerly stool/community lands and were acquired, with due compensation, for development purposes such as forest reserves, mining, housing, public utilities, etc.

Community lands are allocated as family lands and belong to the family for use by its members. Family lands thus acquired may be further divided among members of the family. Each member has the allodial right/title and usufructuary right of use of parcels of the land allotted him or her and can pass the allotted land on to heirs. However, no one has right to dispose of any part of the land. This allodial title is the highest interest in land for all purposes of development. It is alienable to another subject without permission from or approval by the stool or community and it is inheritable. It may also be alienated to a stranger (immigrant) so long as the alienation carries with it the obligation of some service actual or committed to the stool.

Immigrant farmers can obtain farm land on a lease basis either by providing a fee to the Head of the Family, or to the Chief, depending on whether it is family or stool land; or by the "Abusa" system in which the gross revenue from use of the land is shared among factors of production, land, labor, and capital, with the land holder getting one-third share and the tenant two-thirds. Another arrangement calls for the gross revenue to be equally shared between tenant and the land holder. Immigrant farmers are not allowed, under rental systems, to cultivate long-term permanent crops, usually tree crops.

Under community land practices any member of the community has indefinite access to the use of the land, and could therefore undertake major improvements on the land. However, without legal title and disposal rights to land it cannot serve as collateral, thereby limiting access to credit for substantial improvements. The restriction of an immigrant farmer not to grow permanent crops is designed to prevent indefinite possession of land by immigrants.

Under the communal land system, farming land could be subjected to fragmentation, especially where the population-land ratio is very high, a factor which often results in a large number of very small size holdings. Most rural inhabitants in Ghana feel that a more equitable distribution of land resources is guaranteed under a communal system than can be assured if ownership of land was vested in the state.

Questions arise as to whether state lands, especially those acquired for forest reserves, will limit the availability of land for farming. This is a possibility under traditional slash and burn, shifting cultivation farming. The conclusions arrived at by the Land Use Planning Committee, May 1979, appointed to review the question of land tenure with a view to improving agricultural development was that no evidence exists to indicate that the present area of land taken by agriculture is incapable of meeting the nation's agricultural needs. However, focus must be on intensive rather than extensive production practices, and increasing the economic effectiveness of the area now under cultivation. More efficient farming/management systems are required to increase yields from the same unit area of land.

Many Ghanaian land experts maintain that: the traditional land tenure system is not an inhibiting factor to agricultural production; it is fair and equitable and encourage people to enter into farming. Rather, it is the system of production that makes it uneconomical to invest in permanent improvements to the land rather than the traditional land tenure system itself. Encouraging and realizing permanent improvements to agricultural lands by small-scale farmers will require that research devise farming systems and production, fertility and conservation practices that permits vastly extending the cultivation period and reducing the fallow period, of a piece of land rather than having to move to new land every three or four years.

Roads

There are 2,062 miles of roads in the region; 288 miles of primary roads surfaced with tar; 330 miles of major secondary roads, graveled; 366 miles of minor secondary roads, usually graveled; 1,068 miles of feeder roads, generally low grade graveled and/or earthen tracks. All are in need of repair/maintenance. The average total road density is .0942 per square mile of area broken down into .0131 primary roads; .0150 major secondary roads; .0167 minor secondary roads and

.0488 feeder roads. The region requires emphasis on physical infrastructure and marketing improvement.

Agricultural Production

The Region's production is about equally distributed between starchy staples in the forest zone, and cereal grains, grain legumes, vegetables, fruits, and industrial crops in the savannah zone. It is the country's biggest yam producer (38%). Cocoa, although grown in most of the forest zone, remains marginal in parts of it. In 1978, Brong-Ahafo produced the following percentages of Ghana's total agricultural production: cereal grains 11%; root crops 19%; grain legumes 4%; vegetables 26%; fruits 10%; industrial crops 1%; and tree crops 12%. Fertilizer was used on about 11% of the crop land. The table and the discussion on crop production and returns below compares the productivity, incentives and attractiveness to a farmer of different cropping systems in the Region at 1977 prices.

<u>Crop</u>	<u>Gross Cedis per worker/day</u>	<u>Cedi return per worker/day</u>
Cocoa	10.5	7.46
Forest zone foods	12.6	9.45
Yam	11.4	9.37
Maize unfertilized	9.7	8.70
Maize fertilized	13.3	10.20
Cotton	4.5	3.80
Tobacco	7.4	6.30

The table indicates that in terms of the farmers' efforts food crops are more profitable than cocoa, tobacco and cotton, with fertilized maize the most profitable. The laborers' daily wage purchased 5.9 bgs of maize or maize equivalent in food of which 3.6 kgs represented the cost of staples for the laborer and family.

Maize production is encouraged partly by demand and partly because subsidies have masked the social cost. For mechanized, fertilized maize, the real net social benefit is negative. Maize is mainly grown as a cash crop in the region. Crop yields per acre average/vary: maize 3-6,200 lb bags; white yams 1,000 to 1,200, 5-7lb tubers; cassava 7,000-8,000 lbs; groundnuts 600 lbs; cotton 600 lbs; tobacco 600 lbs; kenaf 840 lbs; upland rice 600 lbs; and paddy rice 2000 lbs.

Major Crops Produced and Yields in Brong-Ahafo
(1977)

Crop	Form of Produce	(000)		Long-ton estimated total regional yield
		(000) acred	Long-ton Yield/acre	
Maize 2 crops	Dry grain	98.0	.59	57.8
Rice	Paddy	16.3	.31	5.2
Sorghum	Dry grain	8.0	.30	2.0
Cassava	Tubers	105.4	3.56	355.1
Cocoyam	Tubers	104.0	1.58	222.0
Yam	Tubers	94.6	3.01	241.7
Plantain	Bunches	75.6	2.72	165.5
Groundnuts	In shell	10.0	.45	4.7
Pineapple	Fresh fruit	3.0	1.23	4.0
Oil Palm	Bunches	57.2	2.50	142.9
Tomatoes	Fresh	5.0	1.81	11.9
Pepper	Fresh	25.0	1.15	27.1
Okro	Fresh	18.0	1.80	35.4
Eggplant	Fresh	4.0	1.08	5.0
Oranges	Fresh	3.0	2.60	7.8
Tobacco	Cured leaves	.35	.33	.115

DESCRIPTION OF SMALL FARMERS IN
THE BRONG-AHAFO REGION

It is estimated that of the regions rural population, 696,000, 90 percent, 626,000 engage in farming with the balance in processing, fishing, trading/marketing, honey gatherers, and other supporting entrepreneurs. Of the total labor force of 423,000 there are 310,000 in the agriculture labor force. There are about 87,000 rural householders of which about 78,300 are farm families. The average household has 8 members, 4.8 labor units, cultivates 3 to 4 acres and have about .8 labor units per acre.

Most of the farmers live in settlements, rather than on their farms, and travel up to five miles one way to reach the farm. The average number of working days per year, per effective worker, is 198. The average working day consists of 4 hours on farm labor and up to 4 hours travel usually walking to and from the farm. However, during peak demand periods such as land preparation and harvesting the work day may extend to 10 hours.

The majority of the small farmers practice slash and burn, shifting cultivation. When farm tracks are established the cost of doing so vastly increases due to the temporary location of the farms. The shifting system also requires that storage be temporary or moveable. Farming systems that permit longer term, preferably permanent cultivation of a given piece of land, would enhance increased and economically feasible investment in land, farm tracks and storage. It would also reduce labor requirements for clearing and burning to make new farms, and permit this labor to be used for more productive tasks.

The typical small farmer must contend with numerous constraints: (1) the vagaries of the weather; (2) limited access to production inputs and services, including credit and appropriate technology; (3) labor constraints at peak demand seasons; (4) operates at subsistence level using traditional hand tools and human muscle; (6) has limited opportunity to market produce at the farm gate due to poor condition or non-existence of feeder roads; (7) the petty farm-gate traders lack both operating capital and reliable transportation, requiring that much of produce marketed be head-loaded by the farm family and/or hired labor; (8) scarcity of and long distances from potable water; and (9) lack of appropriate storage facilities.

The small farmers obtain few inputs due to tough competition from large farmers and people engaged in smuggling them into neighboring countries; late arrival in country of fertilizer and other imported inputs for the on-coming planting seasons, and an inefficient internal distribution system; lack of credit facilities and access to loan funds for purchase of the inputs which may have been available; an almost total void of relevant adaptive research generating improved planting materials and/or practices; and little, if any, extending of helpful advise.

The problems listed in the table below were cited by small farmers in the Atebubu District as the constraints to increased production. This is generally valid for small farmers throughout the Region.

Factors which Small Farmers of the Atebubu District Consider too Serious Obstacles to Farm Production

<u>Problem</u>	<u>Frequency</u>	<u>Percent</u>
Poor weather (lack of rain, too little rain, late rains)	672	35.7
Pests (diseases, birds, insects, rats, squirrels, etc.)	521	27.7
Storage/high cost of labor	287	15.2
Lack of farm inputs (fertilizer insecticides, machinery & equipment & credit)	267	14.2
Crop loss by theft, stray live-stock, fire outbreaks, other disasters	43	2.3
Poor (infertile) soil	41	2.2
Too much sunshine	31	1.7
Lack of market infrastructure (storage, transportation, feeder roads)	18	1.0
Too much rain	3	.2
	<u>1,883¹</u>	<u>100</u>

¹ Frequency includes multiple responses.

Source: The Economics of Small Farm Systems and Socio-Economic Conditions in the Atebubu District, E.T. Acquah, et. al., December 1979 - The University of Science and Technology, Kumasi, and Virginia State University, U.S.A., 245 pages and appendixes.

The small farmers in Brong Ahafo Region are typical of the small farmers throughout Ghana. They practice traditional, labor intensive production techniques, using poor quality untempered tools and implements, generally on multi- or intercropping systems. The majority, over 80% of the small holdings, are less than 10 acres in size and account for only 32% of the total land area cultivated; however, they produce about 80% of the national food requirements. They have adapted their production practices to a relative abundance of land, meagre capital resources, and to soils which become rapidly exhausted if farmed intensively without proper fertility restoration and conservation practices. Most of them participate, at least to some degree, in the cash economy through marketing small production surpluses. The productivity is low with small crop yields which have remained static or declined over the last decade.

Rural incomes are generally lower than urban incomes, and the rural areas have far fewer health, education, etc. services and lower life expectancy than the urban areas. The shortages of potable water combined with the long distances to any quality of water during the dry season, and the presence of debilitating diseases are contributing factors to low farm productivity. Agricultural production throughout Ghana, including B/A, has not kept pace with the population growth.

Policies and emphasis in the past have been on large scale mechanized agriculture. This farming system has proven to be ineffective for increasing production, an inefficient use of foreign exchange, and as shown for rice, with very strong implications for other food crops, and real net social benefit has been negative.

The small farmers have had very limited access to production inputs, services, equitable policies and other support which would generate incentives, or a very strong desire among the youth to remain in farming. With the resulting decline in the per capita food production, decreasing real incomes and related factors, the small farmers exist in a highly vulnerable and predominantly subsistence agriculture economy.

The annual population and urbanization growth rates of 3 and 7 percent respectively in B/A is worsening the population ratio/situation directly involved in agricultural production. This will continue to aggravate food shortages and urban unemployment rates unless reversed, or production yields per unit of land substantially increase. The trend and effort of increasing production through expanding the area under cultivation must be reversed to increasing yields through intensification of cultivation and improved management of resources per land unit. Frequently, the past market pricing policies when enforced or abided by have artificially held down farm prices to protect urban consumers. The choices were sell on the unofficial market or suffer the consequences of an unequitable policy. A combination of such factors adversely affect production and further accelerate rural to urban migration, particularly of young and adult men.

The 1970 census suggests that 80% of the women over 15 years of age are in some way involved in farming. Moreover, during the previous decade women accounted for about 92% of the total increases of all persons employed in agriculture as the rural men sought employment in urban areas. As a result women made up about 60% of the agriculture work force in 1970. The trend has not changed.

In many areas women are expected to remain on the farm and have had very little or no access to training or education in improved farming practices. As a result an increasing amount of farm production activities are carried out by women who have had little chance to improve their productivity. These problems are compounded by the women's role as mothers, water carriers, fuel gatherers, marketers of produce and cooks.

The average farm family cultivates a garden for family consumption and raises a few sheep, goats, and poultry for meat. They market a portion of their produce for cash consistent with the size of the holding, labor expenditures and living standards. In addition, to marketed food crops about half of the B/A farm population produce cocoa, cotton, tobacco, or maize as cash crops. Livestock do not seriously enter into trade for sale, but do so as a commodity for food from traders from the north. Generally, what the family eats must be produced on the farm, except for such items as salt, sugar, clothing, etc. Increased consumption of protein requires that it be produced on the farm. Particular attention needs to be paid to increasing the small farm production of vegetables and plant protein, and to encouraging the people to utilize them in the diet.

The transportation system is geared for evacuation of export crops and not to the needs of the small farmer. The transportation costs are very high. It costs at least 1/2 as much to move most imported items (the same for domestic items) from Accra to B/A, average distance 250 miles, as it does to ship it from the Eastern/Southern U.S. ports to Accra.

Most of the food crops (except cereal grains) deteriorate fast when harvested unless they are properly stored, requiring major improvements in the marketing, storage and transportation systems. Sales to traders take place at the farm, village or market depending on the availability of transport to the farmer or the trader. The crops are bulky and head loading is a difficult and lengthy task. If head-loaded, the working days to transport the produce often exceeds the number of days spent in the field producing the crop. Head loading the produce from an acre of yams would require about 75 trips.

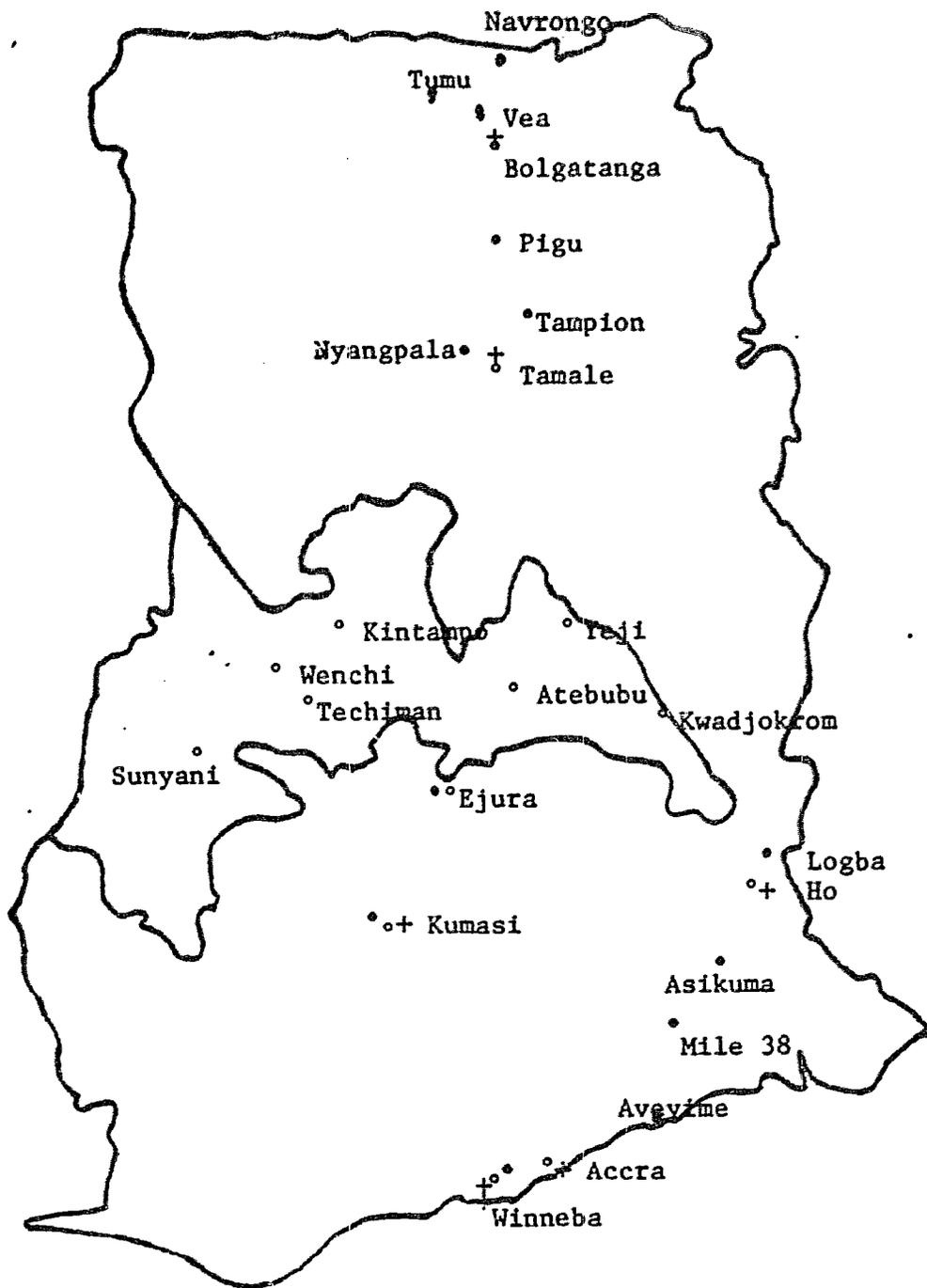
Few small farmers or petty traders can afford lorries or tractors for transporting produce, and are dependent on hiring transportation from others. This is uncertain, erratic, expensive, and the most unsatisfactory link in the marketing system. Transportation will come to the farm gate only if the farmer bulks his produce. The transportation constraints, inevitable delays, and erratic schedule result in considerable waste/loss to the farmer and higher food prices to the consumer due to the resulting shortages at terminal markets. The petty traders have apparently been benefiting from the low volume of trade, but have little to spend their profits on. They should be encouraged to invest in the storage and transportation sector, particularly since the public sector agencies charged with this responsibility have utterly failed to do so.

Small farmer marketing problems are characterized by the small size of the production units; poor communications (physical and informational); little product differentiation, inadequate market and transportation facilities, fragmented markets, unpredictable prices and related constraints to efficient marketing.

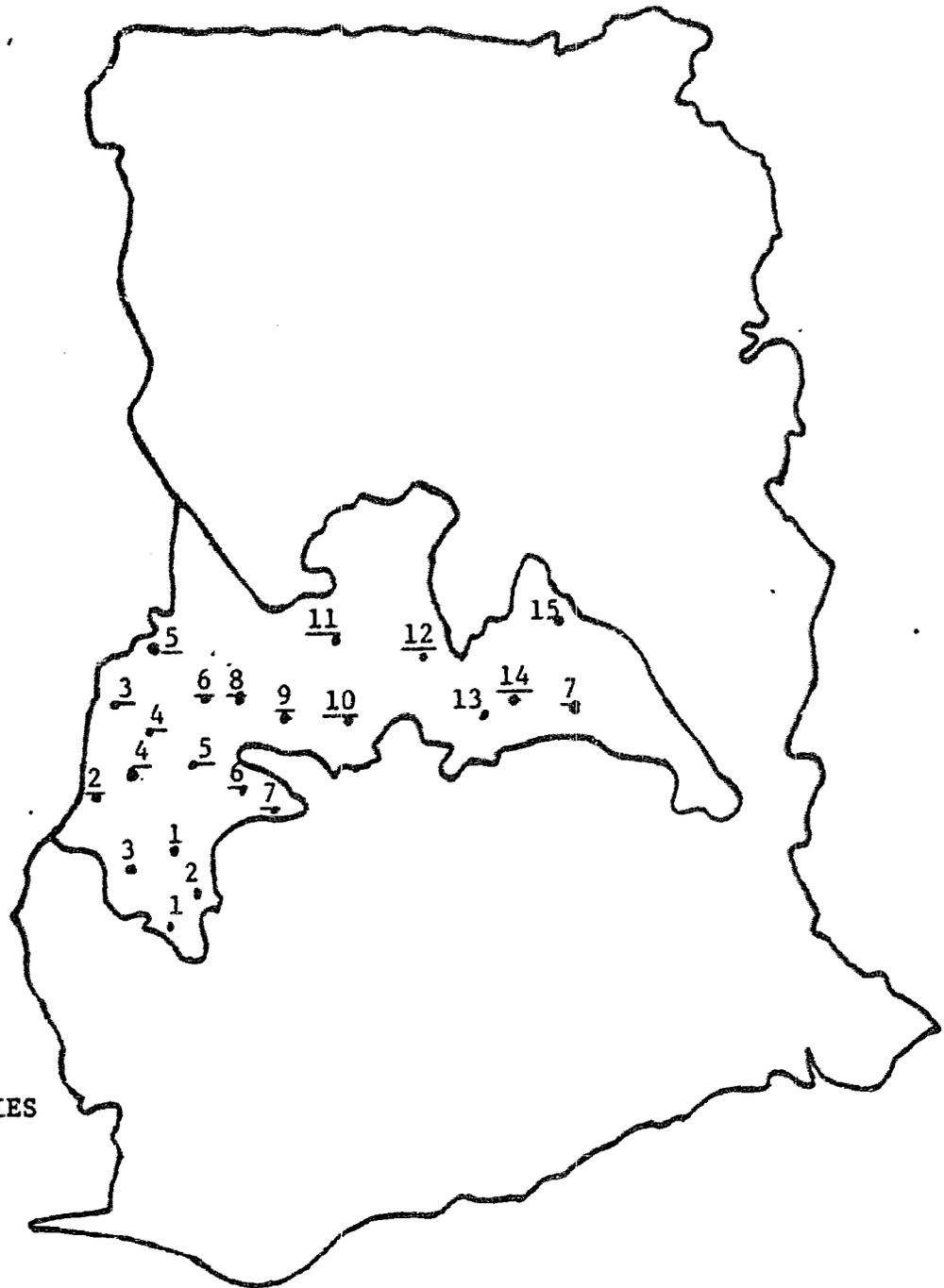
Official exclusion of the private sector from the marketing system by deliberate establishment and provision of resources to public marketing institutions, who in turn failed to provide the essential small trader farm gate services, and who did little better at evacuating produce from the rural markets to the urban markets, and then did so at increased financial and social costs, has had very serious adverse effects on the marketing system.

A more reliable marketing/disposal system demonstrating capacity to cope with increased amounts of produce throughout the year would be a major incentive for encouraging the small farmers to increase production.

At 1979 prices the estimated average small farmer's total annual production costs, including hired labor and the value of family labor are ₦3,980. The average total value of all farm produce is ₦10,000 including produce marketed, food consumed by the family and used for social obligations, planting materials for the next year, and the losses/wastages during storage/marketing. The estimated annual small farm family net cash income was ₦1,000 to ₦1,500. The average annual production credit requirements are ₦1,600.



- o Seed distribution
- + Regional Headquarters
- o Foundation Seed Farms



ACB CREDIT FACILITIES

1. Goaso
2. Dormaa Ahenkro
3. Japekrom
4. Berekum
5. Sunyani
6. Duayaw-Nkwanta
7. Bechen/Bekyem
8. Wenchi
9. Techiman
10. Nkoranza
11. Kintampo
12. Abease
13. Amantin
14. Atebubu
15. Yeji

BOG CREDIT FACILITIES

1. Sankore
2. Kukuom
3. Ayamso/Ayomfo
4. Wamfie
5. Sampa
6. Badu
7. Kwame Danso



° 23 Credit Facilities
+ 22 GNIC Outlets
45 Total Agriculture
Input Distribution Points

ANNEX:

Credit Facilities to be established in Brong-Ahafo
During MIDAS II:

1. ADB (TEN)

Techiman
Berekum
Goaso
Amantin
Kintampo
Japekrom
Duayaw-Nkwanta
Bechim/Bekyem
Yeji
Abease

2. BOG Rural Banks (SEVEN)

Kwame Danso
Ayamso/Ayomfo
Wamfie
Badu
Sankore
Kukvom
Sampa

GNTC RETAIL OUTLETS IN BRONG-AHAFO REGION

	<u>SUNYANI DISTRICT</u>	<u>OUTLETS</u>
1	Sunyani Retail Stores	2
2	Chiraa Retail Store	1
3	Yamfo Retail Store	1
4	Duayaw-Nkwanta Retail Store	1
5	Techimantia Retail Store	1
6	Bechem Retail Store	1
7	Tepa Retail Store	1
8	Nsuatre Retail Store	1
	<u>WENCHI DISTRICT</u>	
	Wenchi Retail Store	1
10	Techiman Retail Store	1
11	<u>LINTAMPO DISTRICT</u>	
11	Kintampo Retail Store	1
12	Nkoranza Retail Store	1
	<u>DORMAA-AHENKRO DISTRICT</u>	
13	Dormaa-Ahenkro Retail Store	1
14	Japekrom Retail Store	1
15	Sampa Retail Store	1
16	Wamfie Retail Store	1
17	Berekum Retail Stores	2
	<u>GOASO DISTRICT</u>	
18	Goaso Retail Store	1
19	Hwidiem Retail Store	1
	<u>ATEBUBU DISTRICT</u>	
20	X X X	1
		<hr/>
	Total Outlets	22
		==

PHASE II TECHNICAL FEASIBILITY

Seed Multiplication

The MIDAS Phase I seed multiplication activities were based on Mississippi State University recommendations for improving the institutional and operational infrastructure of the National Seed Program for Ghana. This plan called for establishing three Foundation seed processing plants, one each at Winneba, Kumasi, and Tamale and two Certified seed processing plants, one of each at Winneba and Kumasi, a total of five plants.

The contract team (Experience, Inc.) recommended the original plan be revised, and the number of plants reduced from five to four, one each at Winneba, Kumasi, Tamale, and Ho. These plants will handle both Foundation and Certified seed by having two separate processing lines in each building, one for Foundation and one for Certified seed.

This technology approach was selected because the GSC will produce only Foundation seed and purchase Certified seed from contract growers. This technology approach places all certified seed production under private farmers-seed producers. By reducing the number of seed processing centers, the capital outlay for one building is saved, and in some instances, one piece of equipment will service both the Foundation and Certified processing lines saving expenditures on commodities.

Further technology changes from the original design altered the drying and storage facilities. The drying technology selected includes wagon-type units supplemented by continuous flow column dryer. The originally designed simple bag-type and bin dryers lacked the flexibility the wagon dryers offer in handling small lots of Foundation seed. The continuous flow column dryers are required for timely drying the larger quantities of Certified seed. Used in conjunction, these two dryer systems offer rapid least risk drying capabilities during peak harvest periods.

The storage component originally designed by the Mississippi State University study included only dehumidified storage for the Foundation seed units and only warehouse storage for the Certified seed units. These recommendations were based primarily upon the assumptions that the large storage facilities in the Tamale and Ho regions could be effectively integrated into the overall system. Storage in Tamale requires no conditioning. However, transporting all the Certified seed to Tamale for storage and retain for planting, considering the condition of the roads, cost of fuels, and shortage of vehicle spares, would be vastly more expensive and a very poor alternative to the technology selected. Ho storage requires conditioning due to the heat and humidity and the resulting seed quality deterioration. The initial technology proposed by E.I. included refrigerated storage; this choice in technology was seriously challenged by the project evaluation team as being too sophisticated for Ghanaian conditions.

The storage facilities will be dehumidified and air conditioned, a satisfactory technology for maintaining seed viability in the tropics, but insects are mobile under these conditions and treatment will be required.

Specific plans for seed inspection (certification) and testing are essential for the effective operation of a national seed program, the USIS was established, autonomous from GSC, to preclude the GSC from inspecting and certifying its own product.

Fertilizer

The Phase I technology of importing fertilizer in bulk, blend/bagging and distributing it has been deleted. No implementation was accomplished. The evaluation team felt the technology was too sophisticated and recommended it not be implemented. Bagged/blended fertilizer will be imported. Staff members of TVA and the International Fertilizer Development Center (IFDC) recommended in January 1980 that Ghana imports three basic fertilizers: diammonium phosphate (DAP) with 18%N and 16%P⁰⁵; urea with 46%N, and muriate of potash with 60%K₂O. These basic fertilizers will meet the current fertilizer requirements of Ghana more efficiently than the fertilizers now being imported: ammonium sulphate 20%N, 15-15-15 and 20-20-20.

The recommended rate of application is 100kg of 15-15-15 per acre as a basic application. The majority of soils throughout Ghana do not respond to potash. Diammonium phosphate and urea, properly applied, will satisfy most of the soils deficiencies and plant nutrient requirements in Ghana. For those few areas where soils respond to the application of potash, it will be applied as a single element. An application of 33kg of DAP with 25kg of urea will provide the same amount of N and P₂O₅ as the present recommendation of 100kg of 15-15-15, or about half the gross weight per acre of applied fertilizer.

The Extension Service will train the farmers in the proper method and rate of application before large scale import of these two fertilizers blends. The high concentrate fertilizers will be introduced to the farmers through the Extension Services trial demonstrations on farmers fields and related training programs. Trials will be conducted to compare the high concentrate fertilizers with those now commonly used, and to teach the farmers the proper amounts to apply.

The objectives of the GFC will be to procure and make available to all farmers, especially small farmers throughout Ghana, fertilizer blends needed for the country's expanding agricultural program at the lowest possible prices commensurate with a viable operation. This objective encompasses timely procurement, distribution, warehousing and sale of fertilizers at numerous outlets throughout Ghana where farmers can purchase their fertilizer needs without travelling long distances to do so.

USAID will provide the services of a fertilizer marketing specialist for 24 months. Working closely with the GFC manager, the USAID provided specialist will be responsible for assisting the GFC and other implementing institutions to design and implement an efficient fertilizer procurement and production inputs distribution system.

Rural Credit

The small farmers will require annual production and medium term credit for purchasing inputs, expanding acreage under cultivation, and increasing production and incomes.

ADB will establish ten and the BOG will establish seven new credit facilities in B/A.

Trained personnel of the existing credit facilities will be transferred to the new credit facilities as they are opened. Therefore, most of the senior positions will be filled by trained personnel. Additional orientation and training needs will be provided by the ADB Training Center and in-service training programs. Improved work organization and time management will allow ADB to staff the new facilities by hiring a minimum of additional personnel.

The locations of the seventeen new credit facilities are being determined through a joint effort by ADB, MPEC and USAID to coincide with the areas of focus on increased crop production activities. This will assure maximum credit coverage, avoid duplicating efforts and competition for customers in a given area, and provide optimum conditions for financially sound and efficient banking operations.

All the existing and the new credit facilities established in B/A will be staffed by personnel authorized to approve loans and disburse funds within certain predetermined loan approval authority. Simplified loan-making procedures and loan approval authority established for credit facility operations will assure that the small farmers receive short and mid-term farm operating loans on a timely/when required basis.

It is envisaged that most of the loan funds (except for labor) will be disbursed through a chit system for the purchase of agriculture production inputs. Operating loan funds budgeted for labor requirements during the crop season will be disbursed in cash tranches as required for each major production cycle.

A marketing/extension/supervised credit service will be provided at each existing and new ADB credit facility. This service will provide improved communications between the AEB, extension agents, distributors and the borrower. Identification of total credit and production input requirements, location of available inputs, loan application assistance to group associations, improved collections, marketing and prices received services will be provided through this service.

Marketing

Marketing considerations such as finance, assembly, transportation, storage, and selling have important repercussions on the farmers production decision making. The characteristics small production unit in B/A faced with a poor food crop marketing system. The constraints in the marketing system (i.e., limited credit for working capital; breakdown of vehicles due to deteriorating conditions of many roads and lack of spare parts, aging vehicle fleet, inadequate feeder road network and limited on-farm storage and market facilities), constitute common bottlenecks to expansion/increase of agricultural production and overall rural development.

The complex nature of food crop marketing, and the problems involved, suggests the adoption of a cost-saving strategy to identify and test alternative interventions on a limited scale replicating on a broader scale those that are successful. This interaction of traditional and modern institutions in the marketing system influences and make substantial demands on a very limited administrative capability. Thus, marketing provides an excellent opportunity for bringing traditional, modern and private channels into the rural development process. The performance of the marketing system within a region varies almost in direct proportion to the underdevelopment of the region. Therefore market reform and improvement must proceed hand in hand with other development efforts and should be an integral part of the agricultural and rural development program and policy. Only as the market system expands and assures a reasonable price for produce will there be adequate economic incentives for farmers to increase production. Increased production can be encouraged by a marketing system that makes consumer goods and production inputs and services readily accessible at least cost. An efficient marketing system requires traders with working capital to evacuate produce from the farm gate; market place facilities that permit efficient bulking and movement of produce; transport equipment maintained in good operating condition and other supporting infrastructure such as feeder roads, and a market information and intelligence program. Interventions have been designed to respond to the above constraints identified by a comprehensive one year study of the marketing system. This makes Atebubu District an ideal location for the pilot marketing program since it is the District where all components of USAID's integrated rural development program are combined including the BIPROD and FAAD projects and inputs from the DAPIT project.

Extension Demonstration

Substantial increases in productivity are not possible using the existing practices and technology. Increases in productivity and incomes require improved technology, production and attitudinal changes among the rural population to accept and use them. Invariably, improved applicable technology must be introduced; it is seldom generated from within. Other institutions will be responsible for providing the production inputs, developing improved production practices and providing supporting services. Extension's task will be to analyze the inputs, services, incentives, production practices and attitudes, and design and extensive agriculture production program for the Region and for improving farmers' receptivity toward change and utilizing improved technology and practices, and investing time, effort and money to achieve increased production and incomes. The project will give special attention to support for: production incentives for farmers; the role and needs of women in agriculture, and the means for motivating the Extension staff to effectively provide the services for which they are responsible.

It is expected that: (a) through the coordinated efforts of all the implementing institutions the distribution and marketing system will be effectively operational resulting in improved farmer access to production inputs and credit; (b) the improved access to inputs combined with more effective delivery of related services and credit will result in markedly increased agricultural production, employment and income; and (c) that small agriculturally related rural businesses will be established and/or expanded for production inputs, processing, marketing, and consumer supplies, resulting from the improved economic conditions in agriculture, further improving the general welfare.

An Extension Information Support and Research-Extension Coordinating Unit will be established to systematically collect data, interpret small farms research results, prepare appropriate information for the field staff to extend to the farmers, review the feedback from the farmers and relay it to the researchers. This information, support and backstopping, will be provided the field staff to assure they have access to and knowledge of new developments, improved production packages and/or technology to extend to the farmers.

The district and sub-district technical officers will receive continual training in the technique of establishing field trial demonstration plots, one of the most effective extension methods, with practical application to agriculture problems in B/A extension methods and practices in general. The officers are seriously handicapped due to the lack of transportation, materials, basic equipment and other tools of extension necessary to effectively conduct field activities and extend improved technology to the farmers. The focus will be on expanding and improving the quality and quantity of education and guidance services, demonstration trials and other field activities, training of, and information and related support including transportation for the staff.

The trial demonstrations and other field activities will be conducted initially with the crops currently grown by the small farmers. As improved varieties of these crops or new crops are identified and proven they will be included in the program. As improved management, production, harvesting, storage, marketing and other related practices are identified they will also be included in the demonstrations and/or otherwise extended to the farmers.

The demonstration plots, to the maximum extent possible, will be placed on a portion of the farmers' fields. The strategy is to start with the farmers' production methods with slight but continuing improvements, and to involve the farmers as much as possible in the planning, planting, cultivation, harvesting and measurement of production. The effort will be conducted and depicted to dramatize the comparison to traditional practices.

One training officer will be assigned to the Wenchí Institute to train the regional, district and sub-district extension staff in extension methods for extending production, management and marketing practices, planning and implementation, extending information, two-way communications and feedback techniques, and evaluation procedures. The short-term courses will be held at the center during the off-season from December to March. During the growing season the training officer will introduce half-day workshops at monthly or bi-monthly intervals at the district level for the discussion and solution of current problems.

Several specialists will be stationed at the regional level in Wenchí. They will advise the extension service in their respective fields of specialization, solve special problems, assist in training technical officers and relay the feedback to the Accra office. The extension specialists will include an agronomist, plant pathologist, vegetable crop specialist, entomologist and a home extension specialist.

When each sub-district is fully staffed, there will be a minimum of two Technical Officers and each technical officer will have two Technical Assistants, plus lay leaders. Each Technical Assistant, under the supervision of the Technical Officer, will establish at least two demonstration plots per planting season on farmers' fields in different villages.

The duties of the Technical Officers and Assistant Technical Officers will be to demonstrate to the farmers of the advantages of adopting improved management and production practices, proven inputs and services. This will be achieved by: (a) village group discussions; (b) individual teaching; (c) result-demonstrations performed by farmers on their fields under the guidance of the training officer; (d) distribution of leaflets and pamphlets; (e) using visual aids at village group meetings; (f) tours to specific projects; and (g) providing assistance to the support team in establishing test plots.

Home Extension Unit

The Home Extension Unit has traditionally been involved in the women's extension activities such as nutrition, food processing and home management. The activity has been expanded to include the production of crops for both home consumption and marketing purposes. It is supported with limited assistance from the Home Science Department of the University of Ghana in developing appropriate materials and information to include in the extension program.

During phase II, the Home Extension Unit will continue its primary focus on a limited number of demonstration homes. These homes provide visual evidence of improved techniques and designs and practical experience to selected women on a living and working basis. Techniques include design of improved houses, housing components, furnishings, stoves, storage facilities and methods, improved sanitation, gardening, foods from trees in the compound and garden, and the propagation and care of chickens, rabbits and goats.

The Home Extension Unit officer in the Regional headquarters at Sunyani will be responsible for the coordination of the Unit's program in Brong Ahafo and provide the leadership and guidance to district supervisors to carry out successful programs. The field workers will be supported and supervised by the district supervisors.

Annual work programs of field workers are as follows: during January-February, individual agents will teach village groups the principles of nutrition in relation to the food production and diet improvement. Follow-up demonstrations will be held at group meetings and in individual compounds and households. During March-June, the major planting season, field workers will advise and demonstrate improved practices in producing staple food crops and small animals. This will be done through group discussions and demonstrations as well as intensified follow-up visits to individual holdings. During July-August, demonstrations will focus on improved practices regarding processing of all crops, on-farm storage and preservation of products consumed by the household. During September-November, the minor crop season, agriculture extension work will be concentrated on improvements in off-season cultivation and the raising of small livestock and poultry. Principles of improved farm and home management practices will be intensified and possibilities for the application of appropriate technologies for work simplifications in the home and on the farm will be explored. Home Extension Unit staff members will undergo the same training as the Extension Service.

Small Farm Systems Research

The research is designed to address and remove the constraints to increasing the production income and improving the welfare of the small farmers in B/A. To develop the improved packages for B/A's small farmers, a systematic and coordinated problem-oriented research effort on soils and farm management and production practices and storage adapted to the physical, ecological and climatic conditions, and institutional and socio-cultural factors will be conducted.

The effort will focus on the precise identification of the critical constraints to be overcome in improving the farmers' productivity, in setting priorities, in organizing agricultural research, and in establishing coordination between research efforts to assure that interrelationships are considered in dealing with a single crop, and between various crops and farming systems, and the physical, biological and social science aspects involved.

The research component will be part of an integrated development design. Cooperating with the other disciplines, a sound knowledge of the existing farming systems and the constraints in the locality served has been obtained from baseline studies. The studies identified constraints upon which to focus the research. The effort will consider and rationalize the farm economics, practicability and social implications of the innovations proposed.

The major role of the research component will be to develop a technical package which the farmer can implement. Initially, the package will be as simple as possible. It will become more complex as the farmer's competence and confidence in himself/herself and in the researchers and extension staff increase. In this respect the economics of the production package will be proven and demonstrated in the field--on farms in the locality, not on the research station--to assure its validity.

There are general applied research gaps in Ghana: a shortage of new agricultural management and production inputs developed which were either actually rewarding to the farmer or which the farmer viewed as such; the research conducted has been inadequately designed and tailored to resolve real, immediate rural development needs, and has slighted the essential linkage between economics, technology and the social environment; and there has been an extreme shortage of adaptive/problem-oriented research conducted. To effectively improve rural-subsistence sector agriculture, research will be based on knowledge of the existing farming systems and agriculture practices, of the constraints inhibiting agricultural/farming development, and be focused on identifying or adapting innovations which are profitable, practical, applicable and responsive to the sector's or farmer's needs.

In addressing the small farmers' problem, the research component will focus on the following aspects:

Farming Systems/Farm Management: Most technicians are aware of the role and need for a profitable technological package in the farming system but have difficulty identifying or understanding the interactions and changes generated in the system through introduction of innovations. This is particularly true with respect to the division of labor between the sexes and the impact of new technology interventions on women who provide the bulk of the agriculture labor force. Since this information is essential the research effort will be

broader than crop variety or agronomic trials and will be an integral part of the program to adapt research results to specific farming systems, and ecological zones. The research will also be closely coordinated with the Extension Service to assure the Extension Staff's training and awareness of the innovations and how they can be applied as a package to the farming system taking full account of the local constraints. This will help assure that the evolving and implemented adaptive research modifies and constantly improves the package with which extension is equipped for its role in the rural areas.

The constraints/research needs will be jointly identified with the farmers, both male and female, and be conducted cognizant of the scarcity of resources on small farms rather than emphasizing optimal combinations of resources to maximize output. And it will be based on subsistence or small crop farming, on the staple food crops of the subsistence farmer. To foster adoption of results by the subsistence farmers, the experimental plots will reproduce the conditions under which the technical innovations developed are to be applied on the farms including the sex of the persons doing the work. A male laborer on a research plot might cope with the new technique, which would be difficult for a woman to implement on the farm due to the extra time, physical strength, etc. involved, particularly since most women already have a long, hard, daily work schedule and may be less well-nourished than the men. All implications and ramifications of the division of the labor will be studied and attention given to relevant research activities.

Over-specification or simplification of research tends to focus efforts on one crop or practice with very little consideration given to its place in or relationship to the farming system or pattern. The optimum planting date, cultural practices, fertilizer requirements and applications, labor requirements, etc. are frequently determined by research on a single crop in isolation. But these optimums for a single pure stand crop have little relevance for the subsistence farm, where the crop is planted in a mixed or intercropping system, and must compete with other crops for the labor and management available to and utilized for the farm as a whole. The recommendations for a given crop or practice will also be considered in conjunction with other crops or practices that precede or succeed them in the rotation or farming systems as a whole. For these reasons the research will be conducted relative to the set of conditions and interrelationships existing on the farms of the locality, not on the research station.

Soils Management: As in food crops, tropical soils management, particularly for small subsistence farming, has been generally ignored in past research efforts. Yet most of the area cultivated is under subsistence production. Therefore, there is little hard, reliable research data for guidance in this very important aspect of agricultural production. Soils management will be included in the research design, to determine the best methods for improving soil conservation and moisture absorption and retention for plant

growth, retaining fertility and tilth, and how to manage the soils to permit sustained cultivation, reducing the need for shifting, slash and burn practices.

Applicability to Farming Systems: The agricultural research program will be designed around and be applicable to the factors of production and resource endowments and limitations of the rural area involved. Tractor-based management systems on the research station may show results but have little applicability on the small holdings that by necessity are cultivated with a hoe or oxen. The research will be conducted with the tools and resources available to or addressing the real constraints confronting the small farmer to identify results that are profitable and can be readily and reliably applied. Farm management, farming systems, production practices, fertilizer response, weed control, etc. will be conducted in terms of the farmers' resources, not the government's resources, or the researchers' erroneous concept of the prestige attached to mechanization and modernization.

Duplication of Farm Conditions: The research component emphasis will be on the crops and productive systems, intensive or extensive, best suited to the available land and the environment; the size of the individual holdings; the resources and constraints with which the small farmer must cope; and the population density the land must support. The farm systems research will be conducted for and be applied to the specific rural economy in which it is located. Seed bed preparation, cultivation, fertilization, etc. will be conducted with the tools available to the rural economy or at most limited to improved tools or mechanization available and within the farmers' means of acquisition. The program will avoid the usual approach in which the research stations and programs conduct research with modern machinery, overhead irrigation, the full range of production inputs which the farmer neither owns nor has access to. To assure that the research is meaningful to the locality it will duplicate the farming systems and the physical, ecological, economic and other conditions of the locality since fertilizer trials, weed control or crop varietal output results, when conducted with a full range of the latest machinery and irrigated farming, do not apply to hoe and hand labor cultivation and rain-fed farming.

Research will duplicate the conditions of the typical small farm in the locality which is four-five acres in size, plowed and cultivated with human muscles and hoes, intensively planted to multiple or mixed crops, confronted with labor constraints at peak seasons, on soils of medium fertility and low in organic matter, and depends on rainfall. The research plots and field trials will not be located on land previously plowed by tractors as this would invariably violate duplication of small farm practices/conditions. If a new variety of food crop is being tested, it will be planted in an inter- or mixed-cropping system if this is the local system, rather than in a pure stand. Fertilizer and insecticides will be applied with the equipment the farmer has or can obtain, but this will usually be by hand. The new technology and innovations that are interjected into these management systems will be done in a manner that remains within the farmers' capability and accessibility whether physical, economic, or otherwise, and every attempt will

be made to avoid disequilibrium of the farming system. Every effort will be made to demonstrate to the farmer through research and field trial demonstrations that it is possible and profitable for him to implement and manage these innovations on the farm.

Input Availability: Problems arise because research is often designed and conducted with the goal of maximizing output per production unit, giving little, if any, attention to the necessary inputs and their availability, and the farmers' ability to procure, provide or master them. If the farmers' view labor as their major limiting factor of production, the research component will avoid developing a new practice or innovation requiring a substantially increased labor input. The same will apply to inputs requiring capital or other resources the farmer is not likely to have.

Equilibrium of the System: Although past research has developed improved varieties of crops and techniques for increasing yields, it has generally given inadequate attention to the economics of the innovations in the farming system, or to management problems which arise and require solutions that render the innovations feasible when implemented on the farm under actual farm conditions. The research will be designed to avoid upsetting the equilibrium of the existing farming systems. This will be supported by completed and subsequent farm studies identifying the practical obstacles to adopting recommendations emerging from research to which researchers will address appropriate attention. Then the interjection of the new crop, technology or innovations will be cautiously integrated into the local area's farming systems to avoid too abrupt shifts/changes in transforming the farming systems.

Multiple Intercropping: Investigations will be conducted on the comparative merits of multiple or intercropping and monocropping. Indications are that total tropical production increases and the effects of weeds and insects decrease under intercropping systems, implying that monocropping may not be the best farming system for small subsistence farmers. This will be evaluated concomitantly with investigations to identify the best mix of crops, and the crops most compatible with the intercropping and rotational system. Since intercropping is a widely used farming system in Ghana, the innovations will consist of improving an ongoing and understood system rather than an interjection of a new system.

Multicropping or interplanting requires attention to several factors: compatible crops, slow starters with fast starters, deep-rooted with shallow-rooted; non-use of excessively spreading varieties or other crops in succession susceptible to the same disease or attack by insects. Heavily utilized soils require ample fertilizer. Insects flourish in constantly growing vegetation requiring control measures, usually frequent spraying and minimum cultivation.

Crop Storage: The total production in the fields may at times be adequate but the quantity of food available for consumption is considerably reduced due to losses resulting from poor storage practices, insects, mold and rodents, and while in transit for storage/distribution. As a result scarce foreign exchange must be expended to replace the food which is produced locally and lost to the country due to improper storage and handling.

While a great deal of effort is expended in trying to increase production, little is expended on protecting this production and reducing post-harvest losses. Success with the latter would do much to avoid the loss and thereby actually add considerable amounts of food to the national stocks. Despite efforts to encourage increased production, small subsistence farmers may well have limited incentive to do so, as experience has taught them that much of the fruits of their efforts will be wasted through such losses. Improved storage and handling may do as much to encourage farmers to increase production and increase the available stocks of food as direct productive services.

Improved on-farm storage will also have direct positive impact on farmer incomes. The need for cash for school fees and other demands and the threat of loss under traditional storage practices virtually force farmers to sell at harvest time, that portion they consider surplus to meet family needs. And the prices received due to market glut, trader speculation and collusion, etc. are low compared to those paid later in the year. On-farm village level storage is extremely important since about 80% of all grains produced in the subsistence farming areas are stored there, and will be included in the research effort.

TECHNICAL ASSISTANCE

Technical services will be kept at the minimum level to assure that the host country short-fall in skills is covered and on-the-job training in these skills is provided.

I. Seed Multiplication Component:

A. Ghana Seed Company Co-Managing Director.

The technician will advise and collaborate with the Board of Directors, General Manager and staff of the Ghana Seed Company in planning and establishing the administrative, managerial and operational structure of the company; and all functional aspects of establishing a comprehensive seeds industry.

B. Seed Processing Engineer/Seed Testing and Certification Technologist

This specialist will be responsible to the Ghana Seed Company (GSC) and to the Ghana Seed Inspection Service (GSIS), to assist and advise in the development of seed processing, certification, and testing programs. He/she will provide assistance to the GSC in training personnel for the entire procedure of seed processing, beginning with the harvesting following through to the final packaging, sampling, testing, storage, distribution.

C. Farm Management Operations Specialist

This technician will train the GSC staff in all phases of seed farm production, management and operations, and encourage and train contract certified and growers in order to increase involvement of the private sector in seed production and distribution.

II. Extension Demonstration Component

A. Extension Specialist

The technician will collaborate with the Ministry of Agriculture, its Extension Department and Home Extension Unit and provide leadership in mounting improved and expanded extension/farming guidance services and field trial demonstrations aimed at helping farmers increase production and incomes and improve farm management practices with appropriate production inputs and services.

III. Small Farms Credit Expansion Component

The technician will advise and collaborate with the staff of the Agricultural Development Bank to; streamline, expand and implement the small farm credit program; assist ADB headquarters staff in managing, supervising and monitoring all aspects of the credit operations; implementation of agricultural lending policies and procedures for streamlining and decentralizing small farmer credit loan making and servicing operations through the credit facilities; and assist and train the staff in small farm credit operations.

B. Credit Training Specialist

The technician will assist in the operation of a training program for (1) new loan officers and supporting staff for credit facilities; (2) regional bank managers and staff; (3) Rural Bank staff; and (4) top management of the credit program. Plans and curricula will be developed and implemented for courses in all aspects of administrating, supervising and monitoring a rural credit program. The specialist will supervise the training program and advise on the establishment of a continuing training program to be carried out by the ADB.

C. Marketing Specialist (Consultant)

The Consultant will assist ADB headquarters staff to design and train field staff to implement program for forecasting production input needs of small farmers obtaining credit and communicating requirements to various input suppliers/distributors; forecasting production and volumes of various food and cash crops to be marketed so that advance arrangements can be made for marketing.

D. Training Consultant - Farmers Group Association and/or Cooperative Credit Course

The Consultant will conduct two courses, each of two months in duration, on organizing, supervising, and management of farmers group association and/or cooperative credit schemes for senior credit facility staff.

E. Training Consultant - Supervised Credit Course

The Consultant will be responsible for training staff on techniques of providing supervised credit services to small farmers.

F. Training Consultant - Project Development

The Consultant will conduct two courses, of two months duration on, preparation and analysis of small farm agricultural projects for financing under the credit component.

III. Small Farm Systems Research

A. Land Management/Systems Agronomist

This officer shall plan, execute and evaluate research activities aimed at developing singular and integrated systems of land management for upland, hydromorphic and valley bottom soils which increase and sustain food crop production, protect and conserve the land base, and rehabilitate soils which have been degraded due to past inappropriate methods of management. Research in land management shall be integrated with research aimed at identifying improved planting materials and mixed systems in order to develop farming systems which combine improved land management techniques with improved crops and cropping patterns. The use of hand and mechanical farm implements in the improved farming systems under development shall be evaluated.

B. Agronomist/Breeder

Duties

This scientist shall plan, execute and evaluate research activities aimed at selecting improved cereal, grain legume and root crops in B/A and developing agronomic practices suitable for use by local low resource farmers which will permit the genetic potential of selected crops to be realized.

C. Consultants

Short-term consultants for special research problems will be provided and may include; pathologists agronomist, statisticians, physiologists, plant breeders, agricultural economist, rural sociologists, etc.

ANNEX III-F

RELATIONSHIP TO OTHER PROJECTS IN THE BRONG-AHAFO REGION

MIDAS will benefit from complementarity with and support from other AID projects. After MIDAS was designed it became evident that there were gaps relative to an integrated rural development program. The major gaps were: lack of farmers associations/local organizations, agriculture support business; supporting infrastructure (such as feeder roads and water development); appropriate technology devices and processes; and local government capable of effectively planning and implementing development.

The Farmers Associations and Agribusiness Development (FAAD) Project 641-0072 provided grants to PVOs to design and implement programs dealing directly with farmers associations and/or small agri-business development. One Ghanaian PVO is sited in Atebubu.

The PVOs in Brong-Ahafo will obtain production inputs and appropriate technology imported under the MIDAS loan, and initially participate in the distribution system. The PVO will also coordinate closely with the Extension component in non-formal education and organization/servicing farmers' groups, and with the other components as circumstances warrant.

The District Planning and Rural Development Project 641-0073 (DIPRUD) is sited in the Atebubu District. It will cooperate with and support the District Council to plan, budget, implement and evaluate the District's development program. It will primarily focus on (1) expanding the Council's capacity to perform administrative/management functions; (2) assist with developing the District Council's ability to identify, design and implement development programs with greater participation from the village development committees and the traditional council; (3) identify required agriculture supporting infrastructure, such as feeder road and water development; (4) support development of an information system which is within the District Government's capacity for monitoring and evaluating the development program; and (5) promote small village and private enterprise activities. The activities under DIPRUD respond to gaps/constraints identified but not included by the MIDAS project and was designed to coordinate with MIDAS activities.

Under the Government of Ghana's decentralization program administration of rural development, projects are to be administered increasingly by regional and local (district) governments. This is definitely the case for both the MIDAS and DIPRUD projects. The Economic Rural Development (ERDM) Project 641-0077 is working with regional and local governments and civil servants in these areas to increase their administrative and planning capabilities. Two two-week seminars have been conducted with all the District Chief Executive Office's staffs and the District Councils in the Brong-Ahafo Region. The programs in the Atebubu District were largely developed around the MIDAS and DIPRUD projects. Future seminars in other districts of the Region will utilize

the MIDAS Project as a focal point for the training since the project is being refocused at the region level. The skills taught under ERDM can be put to direct use by Ghanaian officials involved with the MIDAS and DIPRUD projects. The support, cooperation and performance of local government in the Brong-Ahafo Region will be an essential factor relative to the success of the MIDAS Project.

The Agricultural Management Project 641-0070 was designed to further improve management capabilities within the Ministry of Agriculture. Seminars are conducted for headquarters, regional and district staff. MIDAS benefits directly from this project since much of the implementation directly or indirectly involves MOA personnel.

The Development and Application of Intermediate Technology (DAPIT) Project 641-0084 will assist in establishing a national body to coordinate appropriate technology activities; establishing an information gathering depository and distribution system; provide funds/commodities for R&D; assist the technology consultancy center to establish an Intermediate Technology Transfer/Extension Unit; provide commodities for fabricating proven technology; and assist in developing a technology repair, maintenance and distribution system. There will be adequate concentration on the Brong-Ahafo Region to assure the farmers have access to the resulting technology.

To the maximum extent possible, the Research and Extension components of MIDAS and FAAD will coordinate with DAPIT, field testing technology, offering suggestions for improvement and demonstrating it to farmers. FAAD will initially perform part of the distribution role. The Credit component of MIDAS will provide credit to farmers and small entrepreneurs to purchase the technologies evolving from DAPIT.

Atebubu District, Brong-Ahafo, has been selected as one of the Districts in which the Primary Health Care (PHC) Support Project will be implemented to provide health care services to the rural poor. Upgrading maternal and child health care/family planning services, strengthening the control of malaria, measles and other communicable diseases, and environmental sanitation activities will be part of the program. In addition, the target population nutritional status will be monitored and intervention programs implemented to improve nutritional deficiencies.

MIDAS will coordinate closely with the PHC. This will be partially through transmitting information to PHC relative to health/welfare conditions. Under the DIPRUD activities a limited number of rural health/nutrition/sanitation centers will be constructed. Public Health has agreed to staff the centers which will be available for relevant services under PHC.

The Yellow Fever-Yaws Control Project 698-0410.25 will provide assistance to the Brong-Ahafo Region for administering mass yellow fever vaccinations and a yaws treatment program to all rural inhabitants. Follow-up activities will consist of the surveillance of major infectious diseases to enable the GOG to respond to any reported outbreaks. MIDAS will coordinate with this project in much the same way as with PHC and will directly benefit, since the improved health and welfare of the people will enable them to participate more fully in MIDAS activities. Their increased productivity will raise incomes, a major goal of MIDAS.

The P.L. 480 Title II program will provide support to MIDAS II through the design of community assisted projects for small-scale farmers. The implementation of the measures will place specific emphasis on contributing directly to the development process in poor rural areas and enabling the rural poor to participate actively in increasing agricultural production through small farm agriculture. These activities will complement and support the efforts of MIDAS II.

PHASE II INTEGRATION/COORDINATION

MPEC has the prime responsibility for the integration and coordination of all activities required for achieving EOPs. The MPEC is unusual in that (1) it is a high level interministerial committee established by Executive Decree; (2) has a specified membership consisting of senior level officials of the implementing/supporting ministries and institutions; (3) is chaired by a Deputy Minister of Agriculture; (4) is the key to achieving the integrated/coordinated inputs and services delivery systems; (5) and has a senior rank (former Deputy Director of Agriculture, MOA) project manager, relieved of all other duties, and provided with a secretariat and budget to manage the project. The description of the modified/decentralized operation of MPEC, in line with the project revision.

The USAID's Project Managers and GOC counterparts will be responsible for all appropriate activities of their projects: monitoring/evaluation, documentation, commodities, negotiations at appropriate levels with the host government as required, and assuring general AID support is provided on a timely basis to the project. When problems arise requiring attention/negotiations at top levels of the host government, the Agriculture Development Officer and/or the Director's Office will provide the necessary assistance. USAID's Agriculture Development Officer is a co-opted member of MPEC further strengthening the coordination/integration of activities.

The existing traditional technology used by Ghana's small farmers is producing at near its maximum potential output. Improvement will require introduction of new technology relevant to the circumstances of the target area.

Increased productivity and incomes and improved welfare of the small farmers depend on developing, disseminating and the application of: a proven, adapted and profitable technological packages for small farmers based on social and economic feasibility; improved farming systems and agronomic and resource management techniques, ready availability and accessibility to production inputs including appropriate technology processes and hardware; the credit with which to purchase them; reliable, equitable markets; and advisory services for properly using the above.

Achieving the project's objectives require thoroughly integrated and coordinated efforts of all implementing agencies of GOC and USAID and assuring that all the inputs and services are at the right place at the right time, in adequate quantities.

Particular attention will be given to developing and improving coordinative links within and among the individual implementing institutions, the small farmers, the grant and loan activities and project and non-project entities.

Increasing production and incomes and realizing more equitable distribution of the benefits of development require that all small farmers, not just the more progressive, have access to the improved production inputs, delivery and receiving services and systems, information, credit and national marketing systems. However, it is possible that small farmers could have access to all or part of these services but not to a technological package appropriate to their needs and environmental conditions. It is also possible that the technological package has been developed but that the requisite inputs are not available to the farmers, or that both the technological package and inputs were available but the farmers lack funds or access to credit with which to procure the inputs. Assuming all these are available the farmers will also need extension/information services for guidance in implementing the package, supervised credit guidance for optimum credit utilization, and efficient markets for profitable sale of their produce.

The integration and coordination of project activities therefore is a key activity of the project. The degree of success in achieving the EOPs will be in direct proportion to the actual delivery of the inputs and services, and to the level of integration and coordination of activities performed by the institutions and agencies involved.

Each implementing agency, therefore, must assure that their specific role in the project is fully implemented to provide the inputs or services for which they are responsible. At the same time, particular attention must be addressed to integrating and coordinating the various activities to assure that all the requirements are available and accessible in the right place at the right time. The joint, comprehensive integration of all agencies' activities may well be a more difficult task than the development and provision of the technological packages, production inputs, credit and services by the agencies individually.

Research must develop and prove the technological package. Extension must demonstrate and encourage the farmers to apply it. The GSC, the ADB, the GFC and other institutions must provide and assure that their respective inputs and services are available. The distribution system must assure that the inputs are readily accessible to the farmers; and the marketing system must assure that the resulting produce can be efficiently disposed of at favorable prices.

The Small Farmer Credit program at the field level will function from the rural credit facilities. An officer from the Extension Service will perform the role of Marketing/Extension Officer for the Credit facilities, functioning as a supervised credit specialist. This will assure close coordination between the Credit facilities and the Extension Service in assisting farmers with production and marketing problems, identifying input requirements, amount of credit balanced with capacity to repay to avoid over-financing, and in preparing the loan applications. The Marketing/Extension Officer will also advise the farmers where inputs are available and coordinate with the Extension Service to assure the farmers receive guidance and training in proper utilization of the inputs at the proper time. While assisting the farmers to identify input needs, the volume required for the area will be generally determined, and the input suppliers/distributors will be advised of estimated stocks they can market as guidance for supplies to have on hand.

Through this effort other problems or future actions needed can be identified requiring attention from other institutions or service functions such as research, marketing of storage. Action may be required by agencies/institutions implementing components of the project, or by others not directly involved in the project. The task will be to obtain assistance from the agency/institution having the appropriate expertise to address the problem.

The Extension Demonstration component of the project will play a primary role in the total project testing/demonstrating research findings, farming systems, agronomic/cultural practices, mixed cropping, fertilizer response, etc., on farmers' farms; training and encouraging farmers in implementing the practices; helping farmers determine input and credit requirements; communicating problems to research for investigation; identifying other problems and assisting farmers to obtain the necessary assistance and services from appropriate institutions and service organizations; and generally performing a liaison role between farmers and service organizations, institutions and government. The other institutions and service organizations will coordinate and perform their role individually and in response to requests from each other and the farmers, MPEC will provide administrative/management guidance to this end.

The Extension Demonstration Component, largely but not totally will likewise perform an essential liaison function relative to women's roles, participation in and contribution to agricultural production and marketing, rural development and home management. The Unit will be responsible for the field trial demonstrations for women, and using the model home and gardens.

The activity with rural women will be supported with applied research and staff training activities by the Home Science Department, University of Ghana, Legon.

The Fertilizer Company will determine the amount and types of fertilizers required nationally, import it and assure that the distribution and marketing of the fertilizer is of appropriate quantity to make fertilizer accessible to as many small farmers as possible. The GFC will coordinate with research and extension relative to the best mixes of fertilizer for various types of crops; with extension, credit and marketing outlets relative to the amounts of fertilizer and the time it is needed at the outlet points; and with distributors/marketers to assure the right fertilizers are distributed to the right place at the right time. USAID is prepared to provide 24 months of technical services to assist the GFC to design the procurement and distribution programs, and to become operational.

The GSC will coordinate closely with the Research component and the Crops Research Institute relative to new varieties of crops developed and adapted to different ecological/environmental zones in Ghana, and for obtaining its annual supply of breeder seed from which to multiply Foundation seed.

The GSC will coordinate closely with the Extension Demonstration and the Credit components' Marketing/Extension staff to determine the amounts and varieties of seed required for farmers' demands upon which to base contracts with the contract growers multiplying the certified seed.

GSC will market the certified seed through the distribution system being organized for project inputs, and will coordinate with the participants in the distribution systems to achieve the widest possible distribution of seed into the rural areas.

Basic research on new varieties of crops, soils, plant pathological and entomological problems, etc., will be conducted by the CSIR and other established research institutions. Utilization and performance of the new crop varieties in mixed cropping systems, improvement of small farming systems and on-farm storage, etc., and the application of research results to small farm conditions will be role of the Small Farms Systems Research component. Close coordination and communication will be carried out with CSIR and the regional and international institutions as well as with the Extension and Credit and Marketing Components.

The Small Farm Systems Research component will, therefore, be conducting field experimentation and application of research results generated by the Crops Research Institute and Regional and International Research programs, rather than conducting a more basic agriculture research program. This will generally involve utilizing other research institutions' proven findings in adaptive trials/ testing on small farm systems, cropping patterns, etc., that duplicate small farm conditions in similar ecological and environmental areas. The information, technology and practices thus identified and tested will be fed into the extension network, and the other implementing institutions as appropriate. Feedback to research by the institutions on their performance, acceptability and utility of the information, technology, inputs and practices will enable research to make the proper modifications. This close coordination with the Extension Demonstration Component will assure the Extension Staff's training and awareness of the innovations and how they can be applied as a package to the farming system, taking full account of the local constraints. This will help assure that the evolving and implemented adaptive research findings modify constantly improving the package with which extension is equipped for its role in the rural areas.

The Small Farmer Research component will provide Extension with a technological package and information to extend the farmer. Extension will communicate to research the small farmer's constraints requiring attention. Each component will coordinate their efforts to assure that solutions are identified, made available to, and impact favorably upon the small farmer.

The marketing component, an experimental pilot activity, will be implemented by the BOG/ADB, assisted by USAID-provided short-term consultants. Implementation will be closely coordinated between the BOG and the ADB for credit for market traders to purchase produce at the farm gate; and between BOG and the Extension Component, the private traders, farmers' associations or cooperative marketing societies as appropriate to identify constraints in moving produce from the farm gate to the market stations/places to assure efficient movement of the produce.

Traditional marketing channels by experience have developed a method or system which development experts and agencies took years to discover--the integration of marketing, credit and supply. Purchasing farm produce at the farm gate is only one of these activities performed by the traditional channels. For example, as private traders buy farm produce, they sell production inputs, consumer goods, building materials, fabrics, etc. A great advantage or benefit is that the traders and farmers' associations operate through the year. Particular attention will be given to and effort made for utilizing both the receiving and delivery services of the marketing component.

USAID will provide the appropriate project managers from its Accra office to assure coordination and integration of USAID's assistance with project activities, and that the necessary and agreed-upon support from USAID is provided on schedule. It is very probable that all implementing agencies will be involved in all project component activities, at least to a limited extent, and will need to respond to requests from other project components for assistance. All implementing agencies are expected to be fully and actively committed, implementing, evaluating and modifying actions as necessary. The services, actions and support must be in the right place at the right time and in adequate amounts and commitment, just the same and just as importantly as the production inputs and technological packages. These will all be entwined in the right mix for the project goals to be achieved. The national MPEC in coordination with the Regional MPEC, BIRD and other inputs as required will assure the project is reviewed and evaluated to measure progress and suggest actions for improving integration and coordination to achieve maximum impact on the small farmers. This will be achieved through constant monitoring by BIRD, annual, mid-term and final project evaluations. In addition, baseline studies will be conducted to fill the gaps of the existing BIRD/VSC study in the Atebubu District, and for the balance of the region. Subsequent studies and evaluations will measure project impact on the target population.

ANNEX III-H

EVALUATION CRITERIA FOR MEASURING EOPS

The following criteria for measuring progress are taken from the project paper.

1. Seed Multiplication

(a) Installation and effective operation of seed processing and storage facilities at Winneba, Kumasi and Tamale, bagging seeds in quantities appropriate for all Ghana's farmers. Projections of the quantities of certified seeds to be produced and distributed annually by year 5 are: maize - 12,000,000 lbs, adequate to plant 600,000 acres; rice - 7,200,000 lbs, adequate to plant 102,857 acres; groundnuts - 490,000 lbs adequate to plant 7,000 acres; and sorghum - 1,800,000 lbs adequate to plant 1,500,000 acres; 13,386 lbs of vegetable seeds, adequate to plant 40,810 acres using the transplant method.

(b) Establishment and operation of a seed distribution system reaching not less than 80 percent of the small farmers, in Brong-Ahafo in cooperation with and through the project distribution/delivery system and GSC outlets. (See IV H).

(c) Seeds sold between 10% and 20% profit margin above all production, processing, storage and distribution costs.

(d) Effective management and operation of 4 foundation seed farms for cereal and food legume crops, and one vegetable seed farm.

(e) All certified seed produced by contract growers.

(f) Establishment of the Seed Inspection Service, independent of the Ghana Seed Company, effectively enforcing the seeds law.

2. Credit

(a) Establishment and operation of 5 existing and 10 new, and 1 existing and 7 new rural credit facilities by the ADB and BOG respectively in Brong-Ahafo.

(b) An estimated 23,000 new borrowers and 20,000 existing borrowers provided with annual production and mid-term credit needs in Brong-Ahafo,

(c) The annual training needs of ADB staff, particularly in the rural credit facilities, and the staff of the RBs being satisfied at the ADB training center.

(d) An overall small farm credit delinquency rate not exceeding 20%; uniform delinquency printout system established for all credit facilities; and bad debts being "charged off" and processed as operational expenses when repayment does not result after reasonable collection efforts are made.

(e) Effective loan supervision by the ADB and RBs individual and group borrowers. Each credit facility managed by a senior Projects Officer, plus a full staffing pattern per Section III, B and Annex III, F, as the caseload reaches cost-effective levels.

(f) Additional loan working capital available from increased efforts to expand the savings deposits program and GOG credit facilities replenishment of WC eroded due to annual inflation.

(g) Realizing additional working capital resources from sale of rediscount notes on the secondary market, etc.

(h) Interest rate policy reviewed annually by the GOG to allow the credit facilities to remain as profitable institutions assuming effective management of the facilities.

(i) Loan approval and dispensing authority established for all of the credit facilities.

(j) The simplified, streamlined loan application, processing, collection procedures effectively implemented by the rural credit facilities.

3. Fertilizer

(a) Establishment and operation of an advance fertilizer procurement system.

(b) Establishment and operation of fertilizer distribution system reaching not less than 80 percent of the small farmers in Brong-Ahafo in cooperation with and through the project distribution/delivery system. (See Section IV H).

(c) Price subsidies on fertilizers gradually reduced.

(d) GFC is a commercially viable institution, implementing a fertilizer wholesale and retail price structure reflecting regional distribution cost differentials.

(e) Should a small subsidy be in effect, timely rebate of fertilizer price subsidies from GOG to the GFC and the private distributor/wholesale outlet.

(f) Improved coordination between the GFC and the Research and Extension components, relative to the collection, preparation and extension of information on appropriate fertilizers for small farm crop production.

4. Small Farms Systems Research

(a) Establishment and effective operation of a small farms systems research program in Brong-Ahafo.

(b) The research activity, staffed and conducted by UST, assisted by IITA, and a permanent continuing function of UST with staff positions and required funding approved by the GOG and a permanent part of UST's faculty and budget.

(c) The research program appropriately coordinated with other research activities, national and international, and with the other components of MIDAS.

5. Extension Demonstration

1. The Extension Service and the Home Extension Unit effectively delivering educational services to small farmers resulting in improved farm management systems, production practices and increased production and incomes with special attention to women, farmers, farm laborers and home managers.

2. Demonstrating appropriate capacity to:

(a) Interpret research and other rural development findings;

(b) Adapt the findings to the socio-economic circumstances, learning capacities and environment of, and deliver relevant agriculture education services to male and female small farmers;

(c) Perform the two-way communications role of delivering information to and feedback from farmers to enable the other inputs and services providing institutions to modify them as required.

(d) Utilize field trials and other appropriate techniques and technology in extending the findings to increase the rural populations' production, employment opportunities, income and welfare;

(e) Forge the required linkage and coordination with and between the project and non-project entities;

(f) Place a minimum of 300 improved farm management practices/production inputs demonstration trials annually and assess results with an effective data collection and evaluation system;

(g) Effectively operating a training and support unit for the Extension Service and HEU;

(h) The HEU is effectively serving women in their roles as farmers, farm laborers and home managers providing guidance and encouraging improved practices in and utilization of:

1. nutrition through production of food crops rich in protein and vitamins and using these in the family diet;
2. placing demonstrations on womens farms and/or backyard gardens;
3. storage and preservation techniques to reduce losses and extend seasonal availability;
4. techniques on improved management of farm and home resources;
5. appropriate technology to increase production, reduce labor requirements and drudgery.

(i) Five demonstration home, one eacy year, established and app opriately utilized by HEU in rural women's training and guidance program.

6. Small Farms Marketing

1. The interventions have been tested and evaluated, and an effective small farms, farmgate marketing system operating in Atebubu District. Assuming the pilot marketing program proves successful, a market program designed for replication by GOG in other areas.

2. Marketing program moving increased amounts of produce and providing improved service and incentives for increased small farm production.
3. An ongoing working capital credit program established for small traders.
4. The market transportation service/maintenance center an established and viable operation.
5. Market place improvements completed resulting in more efficient market operations.

IMPLEMENTATION ORGANIZATIONS AND INSTITUTIONS

Agriculture Development Bank

The Agricultural Development Bank (ADB) is the principal source of credit for the agricultural sector. It was established in 1955 as the Agricultural Credit and Cooperative Bank and was renamed in 1967. Its major functions include providing credit for the development of agriculture and agribusiness, promoting agricultural enterprises and operating savings accounts. The operations of the Bank are directed by a Board of Directors consisting of seven members representing the Ministries of Finance and Agriculture, the Bank of Ghana (the Central Bank), and the Department of Cooperatives. The Chairman of the Board is also the Managing Director of the ADB; the General Manager is also a member.

The central office is located in Accra. There are 23 Branch banks strategically placed around the country and 16 Farm Loan Offices (FLOs) extending limited service to outlying rural areas. The FLOs assist applicants in completing applications, inspection of the farms, preparation of certain field reports, collection responsibilities and technical advice to farmers in cooperation with the Ministry of Agriculture's Extension field personnel.

Most loans, groups and individuals are now processed by the Branch banks through the area managers (G10,000) and Branch Managers (G5,000) loan approval authority. The over-the-counter loan approval authority will be extended to the FLOs. The total time period from application to the initial disbursement now amounts to approximately one to two months depending upon workload and availability of loan funds to disburse. Prior to MIDAS the average time period was six months.

Of the ADB's 943 employees 292 are located in the central office in Accra. Approximately one hundred and eighty-three (183) are of senior staff rank. The remainder are divided between middle, junior and staff.

The ADB operates three types of loans: (1) short-term loans granted to enable borrowers to meet annual cash flow farm operating expenses (87% of 1979 loan portfolio); (2) medium-term loans for purchase of farm equipment, livestock, irrigation equipment and setting up agribusiness (10% of 1979 loan portfolio); and (3) long-term loans for new and extensive schemes and/or for improvements of existing ones (3% of 1979 loan portfolio).

In FY 1976, AID initiated a project (040) to assist the ADB in improving its organization and operations and thus enable it to extend credit either directly, or indirectly through group associations, to farmers in the major production areas of Ghana. This project lasted until FY 71 after which time AID assistance to the ADB continued indirectly through the Economic Development Management Project (062). Under these projects AID provided technical assistance and participant training in accounting, management and

agricultural credit. In addition, during the period FY 1966-71 USAID loaned the GOG, for the ADB, the cedi equivalent of \$3,539,760 from P.L. 480 Title I sales for agricultural development loans including small farmers.

Approximately 60% of all loan funds in 1974 were made to 32,951 small farmers (94% of all farmers reached) through group associations. The ADB has had two major problems which has limited its servicing of small-scale farmers. These are insufficient capital resources into the ADB consists of subventions from the Ministry of Finance, funds from the Bank of Ghana, and savings and deposit accounts, as well as from loan reflows; secondly, rediscount market potential other donor country participation and AFDF loan in process. Most of its existing loan capital was tied up in medium and long-term investments of two years or more, reducing the amount available for short-term production loans. Prior to June 1975, the GOG had, as part of its OFY Program, imposed an interest rate ceiling of 6% on ADB loans to farmers. This represented about a 60% subsidy on agricultural loans, given an estimated 15% cost of capital. The interest rate paid on funds from the Treasury and BOG was 5.0 percent, leaving only as one percent spread to cover the costs of loan servicing. These costs had been estimated to be in excess of three percent of the value of loans to farmers. The capital situation was further aggravated by the low rate of collection on outstanding accounts of state corporations and large agribusinesses - 44 percent in 1974. In 1974, arrears on these loans were 63 percent of all loans made by ADB in that year. Arrears on loans made to state corporations on large agribusiness amounted to 8.0 million cedis and 1.2 million cedis respectively. The value of all loans made in 1974 was 14.7 million cedis. These problems, particularly the bad debts of state corporations and large agrobusinesses, and domestic inflation led to ADB's lack of working capital and the need for higher subventions from the Treasury and BOG. USAID/Ghana was informally advised that the ADB, supported by the GOG, arranged for repayment of the delinquent debts of state corporations and that initial payments were made in September, 1975.

In June 1975, the interest rate ceilings on loans to farmers and on savings deposits were raised to 8.5 percent and 7.5 percent respectively. A further increase in the interest rate to 13 percent was made in 1978 which with other charges and loan commitment fees has enabled ADB to cover its costs of loan administration and servicing. GOG's interest rate policy will have to be reviewed annually to maintain the ADB on a cost effective operating basis.

Most of the loans that the Bank processed in 1974 involved group associations, a program initiated in 1969 in which loans are made to farmers for a particular crop on a group basis. The group agreed prior to the loan that all members had to repay their current loan before any member could obtain a subsequent loan. The methods of providing credit have been either to advance these farmers cash or to provide vouchers or chits with which to purchase the required agriculture production inputs. Experience has indicated that these procedures reduce the costs of loan making and servicing, insure that credit is properly used and, by using peer pressure of the group rather

than external pressure, increase the rate of loan repayment. However, less than 5 percent of Ghana's small farmers have access to the annual farm operating credit they need. It has been estimated that many small farmers may have to travel up to 100 miles to file an application with ADB. Once submitted, the application had to be approved on all three organized levels the FLO, the Branch Office, and the Central Office, a process which required up to six months. Since 1976, decentralization of loan approval authority has done much to correct this time consuming loan approval procedures.

In 1974, the ADB requested USAID/Ghana to make an assessment of small farm credit and recommend methods to improve and expand credit service. An AID-financed agricultural credit survey team made several recommendations for AID assistance. The recommendations form the basis for the credit component of MIDAS, and are outlined in the detailed Rural Credit Component description.

Ghana Seed Company

The SMU was established in 1961 under the MOA for the purpose of producing and distributing improved seed to Ghanaian farmers. It expanded with limited resources from an infant program to an institution with improving capacity to meet its objectives, and considerable potential for developing a seeds industry for the country.

With intermittent assistance from AID and other sources it established four foundation seed farms with limited production and processing equipment. A corps of staff was trained, of which 12 were funded by AID between 1961 and 1975. Since 1975 USAID had funded an additional 16 staff totaling 100 months of training.

The GOG attempted to find a foreign company for a joint venture to form a commercial seed company in 1974-75 but was unsuccessful. During MIDAS Phase I, the SMU further improved its operations and competence and in 1979 was converted into the GSC. USAID was requested and provided the services of a technician with experience and background in seed company administration, management, organization, operations and distribution.

The GSC is organized as a commercial seed company. A board of Directors and a Managing Director are responsible for management and operations. The Charter mandates that improved seed will be produced and distributed for sale, priced to cover all production, processing, storage and distribution costs, plus, not to exceed 20% profit.

The GSC produces foundation seed from breeder seed on its seed farms. The foundation seed is sold to contract growers to multiply into certified seed which the GSC purchases, processes, stores and distributes to farmers. The GSC supervises the production of the certified seed. The production and processing of both foundation and certified seed are inspected and certified by the GSIS.

The GSC produces and distributes the following cereal grains: maize, groundnuts, rice, sorghum and millet, and vegetables. Tomatoes, okra, peppers, and garden eggs. The seeds produced, processed and distributed have steadily increased since 1961, except during years of adverse weather. The volumes in pounds in 1977 and 1978 were: maize 2,320,000; rice 8,880,000; sorghum 1,260,000; groundnuts 800,000; and vegetable 4,186. The estimated amount produced in the field in 1979 was a 25% increase over 1978, but adverse weather heavy rains extending throughout the harvest season and precluded harvesting and processing about one-half of it. Therefore, the amount of seed distributed dropped in 1979. Production/importation and distribution of seeds of 18 vegetables increased from an annual average of 312 pounds in 1978 and prior years, to 875 pounds in 1979 and 17,820 pounds in 1980.

Under MIDAS Phase I part of the seed farm production and harvesting equipment, trucks for seed distribution, personnel vehicles and two seed processing, drying and conditioned storage plants, required to enable the company to function effectively, were provided by AID. Under Phase II, the balance of the machinery, trucks and one seed processing, drying and conditioned storage plant will be provided.

The company's long-range targets are to become a self-sustaining, profitable institution meeting Ghana's needs for improved seeds. The annual production and distribution targets in pounds are: maize, 12,000,000; rice, 7,200,000; groundnuts 490,000; sorghum, 1,800,000; vegetable seeds, 14,000 pounds.

Bank of Ghana

Bank of Ghana (BOG) is organized and operates on lines similar to central banks in other countries. It is the sole banker for the government and is responsible for the execution of Ghana's monetary policy.

The role of BOG under the project will be (1) depository and dispensing of local currency generated from the sale of loan commodities such as fertilizer, small farm equipment, etc. The sale of the commodities will generate local currency to finance the annual incremental working capital requirements of the ADB's Small Farm Credit Program; (2) make loan advances to the ADB against the sale of imported commodities which will generate local currency; (3) perform the transaction of direct cedi purchases of some of the AID loan funds (up to 20 percent) in the event that ADB's working capital requirements, for any one year, exceed the amount of local currency generated by the sale of imported commodities; and (4) jointly, with ADB, implement the marketing component of the project which involves the selection and financing of private traders and/or farmer associations to operate a regular marketing service in the Atebubu District.

Its Development and Finance Department will coordinate BCG's responsibility in MIDAS Project implementation with the other institutions/agencies involved.

The Bank plans to establish six new Rural Banks in B/A during phase II providing credit for small farmers and entrepreneurs. These credit facilities and those established by ADB will meet the credit needs of the small farmers in B/A.

BOG established the first rural bank (RB) in 1974 in order to accelerate agriculture production development through mobilization of local savings. The diversion of rural savings by existing commercial banks (most of which are kept in the bank's vaults to meet GOG reserve requirements and/or urban industrial development) will be diminished by local investment of rural savings in the RB. Capital structure of the RB is made up of 50% subscription by the local people and 50% by GOG. GOG's contribution is in the form of preferred non-voting stock. The BCG provides the RBs with free audit, supervisory and staff training services. Delinquency rates are low at RB's because bank capital, loan making and servicing are locally controlled and managed. Loan repayment pressure comes from peers rather than from external agencies. The effects of inflation on WC erosion and replenishment will be shared by GOG and the local RB stock holders/borrowers.

Ghana Fertilizer Company

In 1972, USAID/Ghana was requested by the MOA to support a study by the Tennessee Valley Authority (TVA) to review the fertilizer situation and provide guidance for future activities that would lead to increased and improved usage of fertilizer. A series of TVA studies resulted in recommendations for a national fertilizer blending and distribution program. Based on recommendations in these studies the GOG established the Ghana Fertilizer Company in 1975, and a Board of Directors was appointed.

The GFC was planned as a joint venture with the GOG and a foreign partner with experience in the production and distribution of fertilizer. The GOG owns 20 percent and local banks 40 percent of the shares, and the foreign partner can if it chooses own the remaining 40 percent. The Board of Directors and an acting Managing Director were appointed. The Board consists of representatives from the BCG, the Capital Investment Board, ADB, AGIP, National Investment Bank and the MOA. The representative of the BCG is currently serving as chairman.

The GFC is to be responsible for all fertilizer procurement regardless of the source of funding. The types/blends and amounts of fertilizer imported are to be determined by the national Fertilizer Committee consisting of representatives from Research Institutions, MOA and farmers groups.

The initial plan was that the GFC would (a) develop an advance purchasing system for bulk fertilizers; (b) blend and bag the fertilizer into types and quantities appropriate for all Ghana's farmers (with special emphasis on small farmer requirements); (c) ensure that the finished product is distributed on an orderly and timely basis, extending to more remote areas to permit greater accessibility to small-scale farmers; (d) and sell it at the lowest possible price commensurate with a viable, profitable operation.

To initiate the operations two Bulk handling and bagging units and 12,000 tons of bulk fertilizer were imported in 1975. Crews were trained and the fertilizer bagged directly from the ship. After some initial problems the operation settled down and was successful. The equipment was stored awaiting subsequent action. All the electric motors, wiring, belts and chains were stolen shortly thereafter.

The GFC had acquired a site in the Tema port to install the facilities for unloading bulk fertilizer from ships and for blending and bagging. The site has not been developed. The short-term marketing plan was to commence business with a minimum cash outlay. Distribution and storage costs make up a significant portion of the total cost of marketing fertilizer; therefore, initially, GFC was to procure bulk fertilizer at the most advantageous prices possible and establish a bagging operation at Tema. Fertilizer was then to be distributed to the warehouses currently operated by the MOA. In the long run, the GFC was to construct its own warehouses (wholesale terminals), relieving the MOA of the burden of handling fertilizer and releasing its extension personnel for farmer educational guidance rather than input delivery.

The GOG had determined that the subsidy on fertilizer must be reduced and made plans to this end. The subsidy was to be eliminated for large-scale rice and other farmers in the near future and reduced gradually over time for small farmers. The MOA planned to continue distribution of subsidized fertilizer until subsidies were appropriated reduced, then turn distribution over to private commercial firms. Until that time the GOG/MOA felt distribution should be handled by the MOA rather than rebate the cost of subsidies to the GFC/commercial firms.

Subsequent plans were that as subsidies were eliminated, fertilizer would be sold wholesale from the MOA/GFC warehouses to a group of Ghana based commercial firms having distribution agreements with GFC, and adequate warehouses, transport facilities and as many as 1,000 marketing outlets throughout the rural areas of Ghana. This group includes the quasi-government Ghana National Trading Corporation (GNTC), present MOA distributing outlets, AGIP, BP, Shell, the various state crop development boards, (eg., the Grains Development Board) and farmer cooperative societies. The distributors would then sell fertilizer to farmers at mark-up prices, reflecting the various

transport and storage costs incurred by the distributors and reasonable profit. Profit margins were to be set and monitored by the GOG, resulting in a uniform price of fertilizer per zone, unlike the present pricing policy which has a uniform price throughout the country.

GFC planned to establish wholesaling terminals in three zones of Ghana: Zone 1 at Tema, to supply the Central, Volta and Eastern Regions; Zone 2 at Kumasi to supply the Brong Ahafo, Ashanti and Western Regions; and Zone 3 at Yapei to supply the Northern and Upper Regions. The outlets would either provide their own facilities to transport the fertilizer or rent GFC transport facilities. Large farmers would be eligible to purchase direct from the Tema plant or any of the three wholesale terminals. To ensure that sufficient fertilizer was available for retail to small farmers, the GFC was to package adequate fertilizers in quantities appropriate for small holdings.

Part of the personnel GFC required to initiate its portside operations were to be seconded from the fertilizer operations of the MOA. A principal difficulty envisioned was training this personnel in operating new equipment and in selling fertilizers throughout Ghana. To reach these objectives, in-house training programs were to be developed and carried out, with AID assistance, beginning in early CY 1976. These programs were to be initiated by a TVA consultant currently in Ghana using limited visual aids and training materials provided by the FY 1975 AID program loan. As a part of its efforts to promote sales, the GFC, its outlets, and the MOA's extension and research programs were to jointly sponsor a "grass roots" educational program to create among small-scale farmers an awareness of the need for fertilizer. Providing basic agronomic information was to form the basis for this educational program consisting of demonstrations, farmer meetings, farm visits and field days. As the demand for fertilizer increased, GFC planned to employ additional staff to coordinate the agronomic services campaign. The GFC and its outlets were to work closely with the personnel from extension and credit facilities to determine the demands for fertilizer in various regions.

The GFC, working with the MOA, was to be responsible for determining which of its products were for resale at the subsidized price to eligible farmers and areas, and which products were for resale at non-subsidized prices.

To ensure that the objective of timeliness in fertilizer procurement and distribution was met, the National Fertilizer Committee established in 1971 was to be reactivated and expanded. It was comprised of the research and extension arms of the GOG, GFC and its outlets, and farmers, and was to serve as a coordinating group for all interests related to fertilizer. It was to advise the GOG relative to import and research needs and pricing policies, and the GFC relative to the grades and ratios that should be produced relative to its distribution systems and processes. This committee was to function as a working committee and was to meet at least once per quarter.

MIDAS was to: assist the GFC with its organizational development, fertilizer marketing and distribution process, engineering requirements and staff training; provide loan assistance to purchase mixers, weighers and conveyers for the permanent facility to be constructed in the second year of the project; supplement its working capital available for the import of fertilizer; and grant assistance for additional training materials, U.S. technical assistance and participant training. GOG/GFC incremental contributions were to represent the construction costs of warehousing facilities and the recurrent operating costs of the expanded fertilizer blending and marketing operations.

As of May of 1980, a foreign partner has not been found. No further action has been taken beyond the initial bagging activity. No implementation was accomplished.

Extension Service

The Extension Service is part of the Ministry of Agriculture which is responsible for providing information for improving crop production. It also maintains nurseries which provide seedlings to farmers.

The Extension Service and its responsibility were redefined in 1975, when the Ministry of Agriculture was reorganized. Under the new system, each region is sub-divided into districts (seven in the case of Brong-Ahafo) which coincide with local council government boundaries. An Agricultural Officer or Senior Technical Officer is responsible for the overall administrative and operational duties which are carried out by the Ministry of Agriculture.

Under the directions of the Agricultural Officer, Extension workers promote the use of improved seed varieties, carry out field testing, provide seedlings of various tree crops, hold training courses on proper use of fertilizer and other agricultural inputs.

The Extension Service is an existing institution, established to service national needs. It will continue this countrywide program. However, under MIDAS, it will give priority to implementation of project goals in the Brong-Ahafo Region.

OTHER DONOR ACTIVITIES IN INTEGRATED AGRICULTURAL DEVELOPMENT

A review of other donor activities, active and proposed, indicates that the GOG is employing A.I.D. resources and that of other bilateral and multilateral donors in such a way as to make maximum, effective use of development assistance. The chart which follows indicates donor activities in agriculture on a regional basis. The Mission sees no conflict or duplication between MIDAS II and those of other donors. It should be noted that the seed multiplication element of MIDAS will particularly benefit the activities of all donors.

REGION SPECIFIC INTEGRATED AGRICULTURAL DEVELOPMENT PROJECTS

REGION	DONORS	PROJECT	COMMENT
Northern	Canada	NORIP (Northern Region Integrated Program)	Planning Phase (CDN \$4.5 million) to be underway by August 1980. Team will identify studies and downstream projects for the next 2-years.
Upper	IBRD/UK	URADEP (Upper Region Agricultural Development Project)	First IBRD project for integrated small holder agricultural development in Ghana. Approved in June 1976 for \$21 million and \$11 million from UK. Two principal objectives are to increase farm incomes via increase in agricultural production and establish permanent support services.
Brong-Ahafo	US	MIDAS I and II	See Project Paper.
Ashanti	-	Integrated Rural Development	FAO/IBRD study team in May 1980 recommending follow-on studies in Ashanti, Eastern and Central Regions.
Eastern	-	Integrated Rural Development	See comment under Ashanti Region.
Volta	IDA/IFAD	VORADEP (Volta Region Agricultural Development Project)	Based on URADEP, approved by IDA (\$29.5 million) and IFAD (\$12.5 million) in April 1980. Project seeks to raise agricultural production and farm incomes through the provision of a basic agricultural services package.
Central	EEC	Integrated Rural Development	Funds are to be made available under Lome II Convention, when ratified by EEC members. No program details.
Western	France	WRIRD (Western Region Integrated Rural Development)	GOC request of 1975 renewed in February 1980. Proposals for feasibility studies under review. No commitment by France to finance activities.
Greater-Accra	EEC	Integrated Rural Development	Funds are to be made available under Lome II Convention, when ratified by EEC members. No program details available.

FEASIBILITY ANALYSIS OF THE MARKETING COMPONENT

The marketing component of MIDAS II will continue to assist the GOG test and evaluate in the Atebubu District of Brong Ahafo Region, alternative forms of interventions (assistance) to improve food crop marketing so as to induce increases in production, particularly from small farms. Three activities to be tested are (1) provision of loans to traders to expand and improve farm gate marketing services (2) establishment of a service center (mechanic workshop) for maintenance and repair of market-service transportation and (3) improvements to district market facilities to provide a more efficient bulking and marketing of farm produce (see Project Description).

The expected short-run direct benefits of the pilot marketing program are for the activities being tested to reduce marketing costs and increase efficiency of agricultural marketing services so that (a) increased prices and improved services offered to farmers by traders will induce them to increase their production and (b) lower prices asked of consumers will induce them to buy what is grown. The expected long-term benefits are the identification of approaches, resources and incentives required for the design and execution of a large scale, efficient agricultural marketing program capable of replication in other areas.

Assessment of the impact of the marketing program, therefore, requires (i) an appraisal of the contributions that each of three activities being tested is expected to make, recognizing the interrelationship between the activities towards attainment of program benefits and (ii) an explanation of the assumption(s) underlying the attainment of program benefits.

Appraisal of the Marketing Activities:

In designing the activities for this Pilot/experimental program, it is apparent that not all the activities to be tested adapt readily to formal methods of social benefit-cost analysis. However, the effects of program should be predicted qualitatively and quantitatively, so far as possible, using conventional cost-benefit techniques.

(a) Expansion of Credit to Traders:

It is widely believed that lack of adequate credit for traders is one of the key constraints for an effective foodcrop marketing system. To illustrate this assertion the baseline marketing study conducted during MIDAS I states inter-alia that commercial credit to traders in the Atebubu District has expanded in the last two years by rapid lending by the ADB. These loans have, however, been small and evidence points to significant demand for additional loans. However, present use of trader's funds does not necessarily give a good indication of what traders would do with additional

funds if they had wider access to credit. The only good solution and therefore the strategy of the MIDAS marketing program is to pump an expanded credit into the system which would approximately double the present level of ADB lending to foodcrop traders in the district and to closely monitor its effect. During MIDAS I ₵200,000 were to be disbursed to selected traders. Of this amount USAID contributed ₵53,340 and the ADB ₵146,660. During MIDAS II ADB will solely increase at a rate of ₵67,000 annually. USAID will, however, continue to pay salaries and administrative costs of the additional staff required to implement the trader credit program. The following benefits are expected to be result from the availability of additional credit to traders:

- (a) lowering of marketing costs especially for transportation and to larger volumes of marketing as a result of economics of scale will enable traders to offer higher prices to farmers;
- (b) traders' loans to farmers against crops would provide greater certainty of a market and thereby increase farm output, and, therefore, farmers income in the short run.
- (c) traders will undoubtedly reap some of the gains from lower true costs of marketing but some of these gains would be passed on to farmers because the expanded credit would increase further the competitiveness of what was identified during MIDAS I baseline marketing study to be an already highly competitive marketing system and,
- (d) increases in marketed output would benefit consumer as a result of relatively lower consumer price.

(b) Improvements to Wholesale Market Facilities

Lack of appropriate market facilities was identified as the second major constraint on the marketing of foodcrops in the Atebubu District: MIDAS I funds were earmarked for the provision of improvements to the facilities of the major markets in the District. The specific types of improvements were to be jointly identified through dialogue with a Ghanaian market coordinator hired for the project and assigned to the ADB and individual traders, trader groups and district officials and proposals prepared thereon. During MIDAS II these proposals will be completed and the improvements identified provided with the one trunch of MIDAS I funds and under the supervision of the market coordinator whose salary and support costs. Further improvements are expected to be provided through increased incomes from taxation of users of facilities. The expected benefits from this activity are:

- (i) assembling, handling and storage of farm produce by traders will be facilitated and there will be considerable reduction in losses;
 - (ii) provide hygienic environment for the marketing of food;
 - (iii) reduce risk of loss of profit by first level traders as a result of having to sell products at very reduced prices towards the close of each market day because of insecure storage space;
 - (iv) facilitate the holding of stocks thereby reducing price fluctuations from the glut to the lean crops seasons.
- (c) Service Center

Tractors and trucks play predominant roles in the marketing of foodcrops in Atebubu District. Tractors with carts haul most produce from farm to markets. The baseline marketing survey conducted during Phase I reveals that the supply of usable vehicles notably tractors and trucks in the District remains a problem in the large part because of lack of spare parts and mechanic services for maintenance and repair of these transport equipment. The establishment of the proposed service center which is expected to become operational during MIDAS I will help increase the availability of equipment for hauling foodcrops and thus reduce the cost of transportation due to shortage of haulage equipment. The repair and maintenance services of this facility will be available to farmers, farmers' groups, existing and new equipment owners, traders, etc. It is, however, critical to assess whether such a facility will be financially viable and socially beneficial. Below is an assessment of the viability of the service center facility. Although the service center building and equipment, etc have extended life-span of up to thirty years or more financial viability assessment is made assuming a five-year time frame and all costs and benefits are estimated on an annualized basis as detailed out in attached.

For example, the costs of the footnotes service center buildings and equipment, which are capital items are spread over five years using a five-year 18% capital recovery. On this basis total annualized costs are \$73,663. Annual salaries of mechanics and spare part inventory are and contingency are the other cost items. Income accruing to the service center is estimated as follows: if 30 tractors each worth \$18,000 were to receive regular maintenance which resulted in an extension of their average service lives from a total of three years to a total of five years then income accruing to the center will be \$75,690 per annum measured in prevailing market prices.

When annualized benefits of \$75,690 are compared with annualized costs of \$73,663, private profitability (at private market prices) is \$2,027 per year and the present value of this \$2,027 per year for five years discounted at 18 percent is \$6,339. When benefits and costs are adjusted for taxes and subsidies and for shadow price of foreign exchange, social profitability on an

annual basis becomes \$75,930 and the five-year stream of returns has a present value, discounted at 18 percent of \$237,446. From both private and social standpoint, therefore, the project is extremely profitable. Since the marketing system is highly competitive, efficient operation of the service center and increased availability of haulage equipment and therefore reduce transportation charges to traders will be passed on to producers.

The foregoing analysis of the marketing, three marketing intervention being applied under this pilot program shows that together these activities will reduce the real costs of marketing by lessening the time and effort that traders need to spend in assembling and selling produce, increase in farmers' assurance of the existence of buyers at remunerative prices, reduce farm-to-market cost of transportation and availability of efficient marketing facilities. Lower marketing costs in turn should result in higher returns to farmers and larger volumes of marketings.

The marketing activities are to be closely monitored by the Bureau of Integrated Rural Development (BIRD) of the University of Science and Technology. The BIRD will continuously collect data which will be used for annual evaluation of the program.

BENEFIT-COST ANALYSIS OF SERVICE CENTER
(AMOUNTS IN U.S. DOLLARS)

	Tradable Costs	Non Tradable Labor Costs	Non Tradable Capital Costs	Taxes	Total	Annual- ized Benefits <u>a/</u>	Annual- ized Benefits	Discounted Present value of Benefit <u>b/</u>
Annualized Costs (at private market prices)								
Building <u>c/</u>	2,117	2,728	2,928	2,760	10,533			
Equipment <u>d/</u>	2,616	196	196	925	3,933			
Spare Parts <u>e/</u>	22,275	2,025	2,025	14,175	40,500			
Mechanics(Salaries)	-	12,000	-	-	12,000			
Contingency (10%)	2,701	1,695	515	1,786	6,697			
Total	<u>29,709</u>	<u>18,644</u>	<u>5,664</u>	<u>19,646</u>	<u>73,663</u>			
Private profitability (at private market prices)	29,709	18,644	5,664	19,646	73,663	75,663	2,027	6,339
Adjusted private pro- fitability (at pri- vate market prices adjusted for taxes and subsidies	29,709	18,644	5,664	-	54,017	75,690	21,673	67,775
Social Profitability of COG (tradable costs and benefits evaluated at the shadow price of foreign exchange <u>f/</u>	64,766	18,644	5,664	-	89,074	165,004	75,930	237,446

To convert above analysis into cedis Exchange Rate is US \$1.00 = ¢2.75

Footnotes

a/ The annualized benefits are derived by assuming: (1) Without the project the annual value of tractor services equals the return from the services and there are no quasi-rents; (2) as a result of the project, the use of tractor repair services will increase tractor life from a total of three years to a total of five years; (3) With the project the tractor owners use repair services throughout the life time of the tractor; (4) Because the project allows the expansion of tractor life, quasi-rents are generated and equal the willingness of tractor owners to pay for repair services; (5) 30 tractors will be serviced under the project and thereby have their working lives extended for 2 years each. To calculate annualized benefits the difference between the 3-year, 18% capital recovery factor and the 5-year 18% capital recovery factor is multiplied by the value of a new tractor, \$18,000 (on-the-road). This per unit figure is then multiplied by 30 to get final total as follows:

$$(3\text{-year, } 18\% \text{ c.r.f.} - 5 \text{ year, } 18\% \text{ c.r.f.}) \times \text{Value of new tractor} = \text{Per unit annualized benefit}$$
$$(0.459924 - 0.319778) 18000 = 2523 \times 30 \text{ tractors} = \$75,690, \text{ total annualized benefits.}$$

b/ Discounted present value over 5 years life of project is calculated at 18% discount rate.

c/ Building cost of \$33,000 is annualized using a capital recovery factor calculated at 18% for 5 years. Costs were broken into tradable, nontradable labor and capital, and taxes using figures from work done by John Page ("Development Policy and Economic Performances in some Ghanaian Export Industries; An Analysis of Firm Level Data from Ghana's Timber and Wood Product Sector" unpublished Ph.D. dissertation, Nuffield College Oxford, 1975). The breakdown is 0.201 tradable, 0.537 nontradable, and 0.262 taxes. Page's figures are also used to breakdown nontradable costs further into labor (0.259) and domestic capital (0.278).

d/ Costs are based on estimated workshop and office equipment of \$12,300. Costs are annualized using the same capital recovery factor and estimated life as for building. Taxes are 23.5% and transportation and handling are 10% divided equally between nontradable labor and capital.

e/ Breakdown is 55% tradable, 35% tax and 10% transportation and handling which is divided equally between nontradable labor and capital. Estimated spare parts requirement is \$40,500.

f/ As an approximation of the scarcity value of foreign exchange, a shadow price of \$6/\$1 has been chosen. Whether this estimate is too high or too low will have an important effect on the level of social profitability but the project is highly profitable even at the official exchange rate.

g/ Tradable costs (29,709) are multiplied by the ratio of the shadow price of foreign exchange to the official exchange rate, 2.18.

h/ Total annualized benefits are multiplied by the ratio of the shadow price of foreign exchange to the official exchange rate, 2.18.

Note:

In calculating social profitability of the service center no adjustment was made in the private profitability with respect to imperfections in the labor and capital markets. Primary factor (labor) costs are less than 25% of total annualized costs in this analysis. Social profitability will be understated to the extent that the market wages overstate the opportunity costs of labor. The direction of bias resulting from ignoring imperfections in the capital market is unknown since the shadow price of capital could either exceed or be less than the market rate of interest. But this bias is likely to be small since nontradable capital costs are less than 8% of total annualized costs.

SUPPORTIVE AGRICULTURE SECTOR LOAN (\$20,000,000)

The Agriculture Sector Support Loan will respond to serious agricultural/rural infrastructure and marketing/transportation support constraints inhibiting small farm/rural development. These supporting activities are important for Phase II to achieve optimum success. They will provide added incentives for small farmers to invest the additional capital, labor and other resources required to achieve maximum production, overcome inertia induced by inequitable policies and official neglect in the past, and improve their production and management practices.

1. Marketing, Transportation and Produce Processing/Preparation for Market Equipment and Feeder Road Equipment Spare Parts (\$10,000,000)

The shortage of trucks, tractors, trailers and spare parts to move inputs to the farm, and to evacuate farm produce from the farm gate to the secondary markets, and on to primary urban markets is a serious constraint in the marketing system. This limits both quantities and extends the time required to move produce, and is an obstacle to increasing production and incomes and improving rural welfare. Farm produce, surplus to family needs, cannot be marketed unless transportation is available. Many farmers therefore produce only that amount the family can consume, plus the limited amount that can be marketed in the immediate area. The small farmers could and would produce more if a reliable transportation and marketing system existed.

The lack of and/or extremely poor condition of feeder/access roads adds to the problem. This seriously limits transportation/communication and movement of production inputs to the farm, and produce from the farm or village to the markets. If transportation equipment is available the owners often refuse to travel on the deteriorated feeder roads, and farm tracks. When the produce evacuation equipment is used on these feeder roads or tracks, it soon deteriorates, and is sidelined. Much of the Ghana Roads Departments and private contractors' feeder road construction and maintenance equipment bulldozers, road graders, soil scrapers and packers, trucks, etc., is currently sidelined for lack of spare parts. Provision of the parts (engine parts, tracks, rollers, gear boxes, oil and air filters, tires, bearings, batteries and vehicles) will enable the GOG to put the equipment into effective operation, and upgrade the feeder roads to usable condition.

Parts imported under the component will be earmarked for use in the Brong-Ahafo Region. This loan component will reinforce and enhance the impact of the recently approved World Bank emergency transportation IDA credit, which is targeted to bring in spare parts for selected motor vehicle dealers and to provide a line of credit needed by private highway construction contractors through the Ghanaian Bank for Housing and Construction.

The lack of equipment for processing/preparing produce for market is an accompanying constraint. Shelling maize, threshing rice, sorghum and millet and processing other produce by hand is a time-consuming and wasteful practice. Additionally, since rains frequently extend into the harvest season, considerable spoilage/loss results due to the extra time required to process the crop after it is removed from the field. Mildew, rodent and insect damage frequently occurs during the extended period required for hand processing. Accomplishing these tasks faster with appropriate technology would permit processing and marketing the produce with a minimum of losses. Commodities such as maize shellers and grinders, rice, sorghum and millet threshers, and similar processing equipment would resolve much of this constraint.

2. Fertilizer (\$10,000,000)

Fertilizer is an important production input when combined with other appropriate inputs, services and practices in proven technological packages for increasing production and incomes. This portion of the loan will finance formulations of fertilizer which are determined by research and field testing to be suited to Ghanaian soils and conditions. Implementation of this portion of the loan will be contingent on the establishment of a viable administrative entity to procure and distribute the product in economical and timely fashion.

MIDAS could function without the sector loan, but its potential level of success will be greatly enhanced with the supporting sector loan. The bulk of the project loan, and all of the sector loan commodities will be sold. The cedis generated from the sales will be utilized for local costs support of MIDAS.

RURAL CREDIT INTEREST RATE ANALYSIS

Maintenance of a cost effective interest rate charged the small farmer by ADB should include all of the following cost of operations categories:

Cost of capital, Administration costs, Bad debt loss, Variable Percentage WC erosion due to effects of annual domestic inflation, and Accumulation of capital.

Cost of Capital at concessional rates should be reflected in the annual interest rate review recommendations only as long as they are justified for use in conjunction with the agriculture inputs provided and with sufficient increased production value in excess of total cost spread over the relevant time period of the project.

Administration Costs will most likely remain constant at 8% because of inflation's effect on increased cost and total loan portfolio outstanding at the end of each year.

Delinquencies that do not have reasonable chance for repayment should be reclassified as "collection only" accounts and separated out of total outstanding loan portfolio. When this transfer is accomplished, true delinquency and bad debt rates may be established. Bad debt rates will be reflected in the total nominal of the "collection only" value settled each calendar year through charge off, cancellation or loss WC due to compromise offer adjustment. WC erosion due to bad debt loss can then be accurately reflected in the interest rate charged to the borrower.

The total loan portfolio outstanding will also be represented in real terms to allow for more accurate and meaningful administration cost analysis, delinquency and bad debt rates etc., etc., improvements in cost benefit analysis of the interest rate to be charged the upcoming year.

The GOG will replenish WC erosion due to annual inflation. A reasonable percentage of this WC erosion should be included and reflected in the interest rate charged to the borrower in the future with GOG annually replenishing the WC erosion shortfall. This percentage will assist in gradually eliminating the subsidized portion of the credit component by GOG. The percentage will be established at an annual rate that is reasonable, fair and equitable to both GOG, the small farm borrower and compatible with completion of the project objectives.

Accumulation of Capital should be considered in the annual review on the basis that the real effect of inflation on WC erosion will be absorbed through the combination of interest rate charged and the GOG replenishing the shortfall of WC lost because of the effects of inflation. This cost is considered important to ADB becoming a self-sustaining and profitable business institution.

Total income received should reflect interest received, compounded on a monthly basis, for outstanding balances owed by the borrower, loan commitment and appraisal fees and such other charges as internal transfer, stamping fees and etc., etc..

Summary:

The annual GOG interest rate review criteria should be included as a covenant to the revised loan agreement.

The GOG responsibility to annually replenish WC erosion resulting from domestic inflation minus whatever allowance may be included in the interest rate in the future will be included as a CP to loan fund disbursement.

A definite understanding by GOG, BOG, ADB and USAID concerning the exchange rate to be used when calculating advances due to the ADB by BOG against the value of agriculture inputs on valued CIF PIO/C order and/or CIF valued commodities landed will be negotiated.

1980-81 Estimated Cost Effective GOG Interest Rate for Food Crop Loans

<u>Expense</u>	<u>Estimated ADB Expense</u>	<u>AID/Washington Computer Matrix</u>
Cost of Capital	2.50	2.5
Administrative Costs	8.50	9.0
Bad debt	5.00	5.0
Delinquency	<u>10.00</u>	<u>10.00</u>
Total	26.00	26.5
(2) End User Rate - Est.	20.67	Actual 21.23
Inflation factor	3.00 ^{1/}	N/A
Accumulation of Capital	<u>.42^{2/}</u>	<u>N/A</u>
	<u>24.09</u>	<u>21.23</u>

(3) Estimated effective interest rate for crop year 1980-81

(2-1) Annual interest rate Compounded monthly	15.97 ^{3/}
(2-2) Loan commitment fee	6.25 ^{4/}
(2-3) Other Charges	<u>1.87^{5/}</u>
	<u>24.09</u>

(4) It is expected that the interest rate will eventually carry all operational costs including a normal inflation factor and 2 to 2-1/2% for accumulation of capital.

-
- 1/ Balance of WC erosion due to inflation to be annually replaced by GOG.
2/ Normal accumulation of capital would amount to 2 to 2-1/2%.
3/ Increase annual interest rate from 13-15%.
4/ Increase loan commitment fee from £50 to £100 for a 0-£5000 loan.
5/ Same as "other charges" for 1979.

MACRO-ECONOMIC ANALYSIS

The Ghanaian economy has been deteriorating for over a decade. Real per capita GNP has actually declined, and key growth variables such as the savings rate and the tax/GNP ratio have fallen well below 10%. Even more critically, subsidies, price controls, an over-valued exchange rate, and triple digit inflation have distorted market signals to such an extent that production has become less attractive than speculation, and rationing and black markets are a way of life. The basic question to be addressed in this analysis is the extent to which the economic environment jeopardizes the ability of the MIDAS project to achieve its objectives.

A. The Ghanaian Economy

From 1973 to 1978 real GDP in Ghana declined by an annual rate of 0.7%, and per capita real GDP declined by 3.4% annually. The average Ghanaian is thus 18% worse off than he was in 1973. The sectoral breakdown of the economy over this period is presented in Table 1.

The decline in output was particularly pronounced in the modern sectors of the economy--cocoa, mining, manufacturing, and trade, all of which had rates of decline in annual output of from 3.5% to 9.6% per year. Food production saw some sporadic increase, but less than the growth in population, and per capita food production decline by 2.0% per year. The only major sector which exhibited growth was the government sector (other services), and it is this growth which is largely responsible for the stagnation of the rest of the economy. Between the fiscal years 1973/1974 and 1978/1979 nominal government expenditures increased from ₵738 million to ₵4390 million, while revenues increased from ₵584 million to ₵2525 million. Thus, the budget deficit, which was 21% of expenditures in 1973/74 ballooned to 57% of expenditures in 1977/78. This deficit was largely financed by expanding the money supply, resulting in extremely high rates of inflation, peaking at 104% per year in fiscal year 1977/78.

With the cedi pegged at 1.15 to the dollar until August, 1978, and at 2.75 to the dollar since then, the exchange rate has become increasingly unrealistic. While import prices have increased by a factor of 2.5 between 1973 and 1978, domestic prices have increased by a factor of 14. A rough index of the degree of over-valuation of the cedi can be calculated by comparing the domestic price increase to the increase in the price of imported goods.¹ By this measure the shadow price of the cedi is ₵12 to the dollar. Domestic inflation and an overvalued cedi are linked together in an ever-rising spiral. Foreign goods become so cheap that very tight exchange controls are necessary to preserve foreign exchange. These controls limit drastically the ability of the economy to import raw materials, capital goods, and consumer goods, especially food. The result is a
1. World Bank, Ghana Agricultural Sector Review, Annex 7, p.9

TABLE 1: ORIGIN OF GROSS DOMESTIC PRODUCT (1973-1978)
(Millions of Cedis in Constant 1973 Prices)

Sector	1973	1974	1975	1976	1977 ¹	1978 ¹	Average Annual Growth
Agriculture, Forestry, Fishing	2890.4	3145.1	2518.2	2476.7	2476	2786	-0.7%
Agriculture	1681	1991	1567	1346	1342	1732	+0.6%
Cocoa	853	781	577	747	739	660	-5.0%
Forestry	291	299	293	304	304	304	+0.9%
Fishing	66	75	81	81	91	90	+6.3%
Industry	1126	1119	1109	1080	1126	937	-3.6%
Mining	127	111	105	100	86	77	-9.6%
Manufacturing	715	675	736	704	683	546	-5.3%
Elec., Water, Gas	42	35	33	37	39	35	-3.5%
Construction	242	299	235	239	318	279	+2.9%
Services	1607	1723	1637	1568	1699	1728	+1.5%
Transport	174	203	206	168	167	178	+0.5%
Trade	724	776	642	595	568	563	-5.0%
Other (incl. Gov't)	709	744	789	805	964	987	+6.9%
GDP at Constant Market Prices	5646	6033	5283	5096	5277	5454	-0.7%

1

Preliminary estimates. Source: Central Bureau of Statistics, Accra.

deterioration of domestic production, reduction of the supply of domestically produced goods, and further inflation.

The inflation has also led to a severe reduction in real government revenues and domestic saving. Real government taxes in 1978/79 fell to 44.6% of their 1974/75 level, and the domestic saving rate fell to 6.5% from an average of 12.5% over the half-decade 1970-75. These macro problems were exacerbated by two government pricing policies which seriously distorted relative prices. Cocoa prices to producers were kept extremely low even as world prices reached record highs. Between 1972/73 and 1976/77 cocoa prices to the producer increased by 334% while food prices increased 1300%. In 1977 the cedi price of cocoa to the producer was ₵0.67 per pound, or one-fifth that paid to Nigerian cocoa farmers at the shadow exchange rate of ₵5 to the dollar.

1.

$$E_s^{79} = \frac{(E_s^{72}) (P_d^{79}) (E_n^{72})}{(P_i^{79}) (E_n^{79})}$$

where

E_s = the shadow exchange rate

E_n = the nominal exchange rate

P_d = the domestic price index
(1972 = 100)

P_i = the import price index
(1972 = 100)

The lack of price incentive has led to substantial smuggling (perhaps between 15% and 20% of total production) and a decline in output. In 1977 cocoa production fell to an all time low of 277,000 tons just as world market prices reached a record high of \$2,780/ton. Consequently, even with a doubling of the terms of trade, export values fell from 23.4% of GDP in 1973 to 9.6% in 1978.

The second policy distortion was the failure to allow interest rates to rise to reflect the real cost of capital. With inflation out of control, real interest rates were substantially negative; hence, savings have dried up. Credit was necessarily rationed and channeled into the speculative sectors such as construction and trade, rather than into production.

All of these problems are linked and a successful turn-around of the economy requires action on all fronts--removal of subsidies, indexing of interest rates; readjustments of cocoa prices, fiscal constraint, and devaluation. The political and moral effects of this history of economic mismanagement are as grievous as the economic impacts. When markets fail, rationing and black markets become a way of life, corruption flourishes, and the government is seen as ineffectual and dishonest. This leads to a spiritual malaise, a weary cynicism, and political instability. In such an environment there is a real danger of radical political interventions either from the left or from the right.

The impact of Ghana's economic decline on the agricultural sector has been mixed. The cocoa subsector's performance has been dismal, with the value of output declining at 5% per year between 1973 and 1978. Food output has also declined over this period, but high food prices have allowed farmers' real incomes to remain at 1974 levels, or perhaps, to increase somewhat. Price distortions in the agricultural sector favor the food farmer, as fertilizer, machinery, seed and credit are all heavily subsidized, while output prices are essentially uncontrolled. With normal weather, an abundance of land, and prevailing prices, incomes, even of small farmers, are likely to be at or above the national average.

Recent economic policy, both of the AFRC, and of the present Limann administration, offer some promise of improvement. Budgetary constraint may lead to some abatement in the rate of inflation. In the agricultural sector, the producer price of cocoa has tripled since 1977, and there is a commitment to reduce the subsidies on fertilizer and seed. The government is also attempting to pursue tax collection more vigorously, and has raised excise rates on certain commodities. The increase in the price of petroleum products by more than 100% should reduce smuggling and allow a more rational distribution of petrol supplies.

Equally important is the government's commitment to issue foreign exchange licenses so as to procure "necessary spare parts for existing plant and equipment, and to provide the infrastructural base for production expansion in agriculture and industry." This, coupled with a development program emphasizing consolidation and rehabilitation, particularly of seed farms, farm machinery, irrigation systems, feeder roads and transport, should go some way to easing the bottlenecks which have stifled production. Thus, the near future portends some improvement in the movement and production of goods, a somewhat more solvent government budget, an increase in cocoa production, and a more rational allocation system. However, these sectoral policies are not likely to be more than a palliative without a substantial devaluation and an increase in the interest rate.

B. Government Economic Policy and the MIDAS Project

In this section we will examine the ways in which the economic policies and problems described above will impact on the ability of the MIDAS Project to achieve its objectives. We will examine four key areas--inflation, government subsidies, interest rate policy and the exchange rate.

It must be first noted that inflation per se does not reduce real income. As output prices go up they endanger increases in income exactly offsetting the price increase. Thus for the economy as a whole, the first round effect is merely to change the unit by which goods and services are measured without reducing or increasing the flow of real goods and services, and thus real incomes. However, inflation does act so as to redistribute income from those whose nominal incomes are relatively fixed to those whose incomes are relatively flexible. It is not possible to say with precision which groups in Ghana have prospered and which groups have suffered. However, cocoa farmers have almost certainly been hurt while food farmers have at least kept up with inflation, and may have profited from it. Since food prices have gone up faster than inflation and input prices, which are subsidized, have increased slower, then, even without increases in productivity, farm incomes will rise relative to the national income.

It is the second round effects of inflation that are so insidious. With no futures' market, rapid inflation increases farmers' uncertainty making allocation decisions more difficult. The easiest way to make profits is to speculate in commodities, and thus investments get channeled into inventory accumulation rather than into real capital goods. A more serious problem is credit scarcity. Inflation has seriously eroded the ability of the Agricultural Development Bank (ADB) to make loans. Table 2 presents data on loans by the ADB to small farmer cooperative groups throughout Ghana. Between 1971 and 1978 the number of groups receiving credit grew by 68% per year, nominal loan funds grew 37% per year, while real loanable funds grew by only 2% per year, consequently reducing the size of loans available to farmers to 3% of what was available in 1971. While in part this may reflect the inability of ADB to increase its capitalization in the face of inflation.

Table 3 presents the balance sheet for the Agricultural Development Bank for the years 1971 through 1978. All entries have been deflated so as to provide some idea of the erosion of capital. Loans peaked in 1974 at ₵44.7 million, but by 1978 they had fallen to ₵24.5 million. With no devaluation of the cedi over the MIDAS Project period, the proposed \$25 million sector loan will generate ₵13.8 million per year, which in terms of 1973 prices is ₵2.25 million or 9% of present loan volume. The ADB is decapitalizing at 14% per year in real terms. Thus, even under the favorable assumption that the cedi proceeds of the Sector Loan will be constant in real terms, the ADB will be

TABLE 2: SMALL FARM GROUP LOANS BY THE ADB

Year	Number of Group Loans	Number of Farmers	Size of Loans (Nominal.) (000s ₵)	Size of Loans (Real) (1973 Prices)	Real Loans per Farmer Cedis
1971	91	2275	2110	2729	1200
1972	-	-	-	-	-
1973	946	23650	7038	7038	297
1974	771	19275	7440	6019	312
1975	1047	26175	9905	6734	257
1976	-	-	-	-	-
1977	2086	52150	18945	4951	95
1978	2134	47728	24453,000	3132	37

TABLE 3: REAL BALANCE SHEET FOR THE AGRICULTURAL DEVELOPMENT BANK
(1973 Cedis)

	1971	1972	1973	1974	1975	1976	1977	1978
<u>Liabilities</u>								
Share Capital	16.0	20.3	19.2	16.9	14.4	19.3	15.9	8.4
Special Funds (Bank of Ghana Advances)							8.3	2.9
Current Deposits	5.4	18.5	29.2	39.7	41.5	38.1	36.9	23.8
Total	21.4	38.3	48.4	56.6	55.9	57.4	61.1	35.1
<u>Assets</u>								
Cash	1.2	2.2	2.9	5.3	6.1	7.5	12.0	4.5
Short-Term Notes	5.8	8.9	4.8	1.6	2.9	4.5	5.9	4.0
Loans	12.9	25.9	37.5	44.7	42.4	40.6	39.1	24.5
Other Assets	1.7	1.9	3.1	5.1	4.5	4.8	4.0	2.0

Source: ADB, Annual Reports.

decapitalizing at 5% per year. The situation is worse if prices for sector loan commodities remain pegged to CIF prices and don't rise with local inflation rates. The impact of this decapitalization on the MIDAS Project is shown in Table 4. Loan requirements in Brong-Ahafo are based on current needs plus project target estimates. The assumed repayment rate is 90%. Inflation is assumed to be 40%.

TABLE 4: CREDIT DECAPITALIZATION IN THE BRONG-AHAFO REGION

Year	Loan Requirements	Repayments (Millions of Cedis)	Sector Loan Proceeds	Savings	Total Funds Available	Funds as Share of Requirements
1981	41.3	15.3	12.3	8.2	35.8	86.6
1982	67.1	32.2	12.3	8.7	53.2	79.3
1983	113.4	47.9	12.3	9.2	69.4	61.2
1984	193.4	62.5	12.3	9.7	84.5	43.7
1985	270.8	76.1	12.3	10.3	98.7	36.4
1986	433.3	88.8	0	10.9	99.7	23.0
1987	693.3	89.7	0	11.6	100.3	14.5
1988	1109.3	90.7	0	12.6	103.3	9.3
1989	1774.9	93.0	0	13.3	106.3	6.0
1990	2839.9	95.7	0	14.0	109.7	3.9

The other costs of inflation relate to the cycle of inflation and over-valuation referred to earlier. If Ghanaian inflation is 50% per year, while the world rate is 15%, the cedi loses 35% of its value each year. If the present shadow price of the cedi is 10 to 1, by 1985 the shadow price will be 45 to 1, or sixteen times the present official rate. All imported commodities sold at the official CIF price will be sold for 6% of their true value.

This is particularly critical with respect to fertilizer which is subsidized presently at 92% of the real import price. Even were the Government of Ghana to charge the CIF price for fertilizer, the subsidy component would be 72.5% (using a shadow price of £10 per dollar). What are the implications of such enormous differentials between the shadow price and the market price?

First, the budgetary implications are substantial. The World Bank estimated that in 1976, the cost to the GOG of subsidizing fertilizer was £9.2 million or about 1.5% of the government deficit. More importantly the fertilizer subsidy represented 25% of the current budget for all agricultural development excluding cocoa.¹ Secondly, there is the possibility of smuggling. The smuggling issue has been overdrawn in one sense. If agriculture is as profitable in Ghana as it is in neighboring states, there is no reason to believe that the returns from selling fertilizer in Togo, for example, are any greater than the returns from using fertilizer to grow maize in Ghana. While there is obviously more risk in using fertilizer as an agricultural input, there are also transport costs, bribes, etc., involved in smuggling which may offset these risks, if fertilizer use is at all appropriate. If there are indications of substantial smuggling then the inference is that fertilizer is not cost-effective in Ghanaian agriculture.

The main concerns are distributional. With enormous profits to be made in using fertilizer at subsidized prices (either for smuggling or on the farm), it is not surprising that fertilizer will be bought by those with access to distribution and MOA officials responsible for distribution, i.e., the larger, mechanized farmers, the trader, and the petty capitalist. Extreme care must be taken under such conditions, to insure that fertilizer reaches the small holder.

Similarly, subsidies to interest rates are not likely to lead up to diversion of lending from agriculture to trading. Like many other situations in Ghana interest subsidies cause a movement from market allocation to rationing. Under such a regime there is no guarantee that credit will be given to those most willing to pay for it, i.e., those who will benefit most from it. Thus, credit may not be allocated to those farmers who will increase their output by the greatest extent. The financial costs of negative interest rates have already been discussed. There is little reason to hope that the ADB can increase, or even maintain, the scope of its operations under the heavy decapitalization which will occur as long as the interest rates remain negative.

The over-valuation of the cedi compounds the problem. With imports and exports undervalued foreign exchange becomes a very valuable commodity which has to be rationed. With no market, foreign exchange often finds its way into the hands of the wealthy and the powerful. In any case, government has no rational way for determining which foreign exchange uses are the most important. Consequently, shortages abound.

The principal complaint in Ghana is the shortage of spare parts for transport and equipment. Transport constraints, distribution problems, processing constraints, input shortages, all combine to keep output from growing. Capacity utilization in manufacturing is believed to be below 40%, mainly due to these supply problems.

The foreign exchange problem has also led to a severe reduction in consumer goods. Between 1970 and 1978 domestic availability of non-food consumer goods has probably declined by 5.0% per capita, and may have deteriorated even more sharply during 1979. This problem is probably even more severe in the rural areas. If consumer goods are unavailable, a real question arises as to whether farmers will increase acreage and yields at the expense of their leisure time, to produce goods for cedis which: (1) they can't spend, and (2) decrease in value by at least 35% each year.

Even with skyrocketing food prices decline in modern sector activities, and decreases in cocoa output, there is no evidence of increasing acreage or output of food crops. Some of this failure is due to the supply and distribution problems discussed above, but others may be due to the failure of farmers to perceive any real benefits to be gained by increasing their effort.

The present democratic government in Ghana has embarked on a program of sectoral reform that may improve the performance of certain key sectoral of the economy (cf.p.3). Thercent decisbn to raise civil servants' salaries by 50% retroactive to September 1979, is likely to undermine the policy of fiscal restraint. Thus inflation can be expected to continue unabated for the near future, at rates between 50 and 100 percent. There are strong indications that the government will not consider devaluation; consequently, the difference between the official exchange rate and the black market rate is likely to grow. By conservative estimates, without a devaluation, the black market price of the cedi in 1985 may be 60 to the dollar, or 4.5% of the official price.

Such a development is likely to continue to exercebate those conditions which exist today--subsidized inputs, negative real interest rates, decapitalization of the credit base, poor incentives for cocoa production, stagnation of the modern sector, decline in tax revenues, decline in saving and investment, continued government insolvency, and a continued dissatisfaction of the Ghanaian people from their government. These developments will impact on the components of MIDAS in the following ways:

Fertilizer

Inflation and subsidies could lead to some smuggling and some misallocation. These problems are minor; however, compared to the problem of insuring supplies are delivered to the small holder. If smuggling does not turn out to be a problem, this is prima facia evidence that fertilizer inputs are not economically sound in Ghana at this time.

Seed

There seem to be no macro-economic constraints effecting the seed component.

Marketing

High rates of inflation offer large opportunities for profit. Inflation is highest in food crops. There is no evidence that smuggling is more lucrative than trading food crops, so there is little economic reason to expect traders not to perform the roles set out for them in the project.

Extension

There is substantial anecdotal evidence that extension workers spend considerable amounts of time on non-job related activities in order to augment income. This problem is endemic in an inflationary economy with severe shortages. The performance of extension workers is likely to be well below potential, but there is no way of judging from current evidence how severe this problem is likely to be.

Credit

The credit component is the most susceptible to macro-economic difficulties; severe decapitalization is almost certain to occur. It is unlikely that the ADB will be able to reach its projected targets without resorting to inflationary Central Bank money creation.

Research

There is no macro-economic impact on the research component.

C. The Economics of Smallholders in Brong-Ahafo and the MIDAS Package

The MIDAS package as presently constituted projects both more intensive and more extensive farming in the Brong-Ahafo region. The critical question to be answered is what are the constraints limiting increases in output today. For instance, estimates of net income per hectare in Brong-Ahafo under traditional slash and burn technology, range from $\text{¢}400/\text{ha}$ in maize to $\text{¢}2500/\text{ha}$ in cassava. These incomes are net of farmers' return to their own labor, and do not involve the use of modern inputs such as fertilizer or improved seed. The land area in the savannah zone of Brong-Ahafo which is under cultivation is 5% of total land area. Assuming half the land cultivatable, and a bush-fallow system of three years under crops and eight years fallow, only 35% of the available land is currently being farmed. Obviously, land is not a constraint.

There are four possible constraints inhibiting the increase in acreage under cultivation--labor, credit, management, and incentives. Let us examine each in turn.

Under the assumptions used in the economic analysis of the project, labor utilization among farms affected by the project will increase from 13,285 man-years to 39,495 man-years, while hired labor will increase from 3,321 man-years to 29,531 man-years. Thus the MIDAS Project is based on an increase in labor of 197.3% and an increase in hired labor of 789%. There is no evidence that such labor will be forthcoming without substantially increasing the production costs to the farmer. Indeed, if cocoa production revives, there will be substantial new labor demands from the sector as well. All of our information on this issue is anecdotal. There has been no study of labor needs or migration patterns in Brong-Ahafo, so it is unknown to what extent labor is a constraint. The MIDAS Project does not address this question.

The second possible constraint is managerial ability. While small farmers have been shown to be efficient producers under traditional technologies, it is uncertain to what extent they are able to expand their farms without some loss in profitability. Once again, this constraint is only conjectural as we have no evidence on returns to scale in agriculture in Brong-Ahafo.

The last two constraints--credit and incentives are opposite sides of the same coin. If farmers have ample cash incomes and little to spend it on, then they have no incentive to increase production, and equally, no need for credit. If, on the other hand, they are unable to expand operations because of lack of credit, then they are likely to be short of cash, and the incentive problem is minimal. Which constraint is operative in Brong-Ahafo?

The evidence is sketchy but does provide a composite picture implying that credit is not a binding constraint. This is especially true in Atebubu where much of MIDAS is to be concentrated. The Pearson, et al study of marketing in Atebubu states that 59% of farmers interviewed obtained some kind of credit, although only 47% of those (28% of the total sample) received credit from the ADB. The rest relied on relatives (32.8%), traders (46.2%), and money lenders (2.5%). There is no evidence that farmers are required to pay heavy interest charges, for of 133 loans made by traders, 103 were repaid in cash for which no explicit interest rate was charged.

Equally important in the Peason study showed that farmers were able to time their marketing so as to maximize their income. For example, only 5.9% of 393 farmers said they had to buy back the same crop they sold, and for 96% of these the reason was inadequate storage facilities. Only 2% of the farmers sold their crop before it was harvested, another indication of the farmers' reasonably strong financial position.

Another way of estimating farmers' credit needs is to look at farm budgets to estimate cash incomes. Using estimates provided by the USAID credit officer, farmers' cash incomes are about ₵3000 per farm family. Data from the Peason study suggests gross cash incomes for farmers in Atebubu of ₵10,000. All of these pieces of evidence imply that credit is not a constraint, at least in Atebubu.

If the preceding is a correct description of the constraints impeding the growth of agricultural production in Brong-Ahafo, there is substantial doubt that the MIDAS Project, as presently constituted, can remove these constraints. The labor problem can be dealt with by increased mechanization, the management problem if it exists, by extension services. However, there should be a careful evaluation to determine whether farmers are likely to respond to the MIDAS package by changing technology and expending output, given the inflationary economy in which they operate. This is especially important as there is no indication that inflation will diminish the project life.

ECONOMIC ANALYSIS - MIDAS II

The purpose of this analysis is to evaluate the MIDAS II Project in terms of its expected net incremental benefits to the targeted 15,200 small farmers in the Brong-Ahafo Region. It is estimated that these 15,200 farmers will be the recipients of the full MIDAS package of inputs. Since some components of MIDAS, primarily the nationwide seed and fertilizer components, will benefit more than just 15,200 farmers, it was necessary to estimate the portion of the costs of MIDAS that applies exclusively to these farmers. The first part of this analysis, therefore, only evaluates 67% of the total costs of the MIDAS II Project. The results should be indicative concerning the cost effectiveness of delivering the total package of intended agricultural inputs under MIDAS.

An economic analysis should evaluate the costs and benefits of MIDAS in terms of its net returns to the country, as opposed to a financial analysis which would focus on the net returns to the 15,200 farmers. The object of the analysis, therefore, will be to derive a rate of return to the project that conceivably could be compared to rates of return on alternative projects in Ghana. In order to accomplish this kind of analysis, shadow prices will be used instead of current financial prices whenever opportunity costs differ from current costs. Inflation will be assumed to affect costs and benefits proportionally and hence will not require consideration in this analysis. The economic analysis also does not include the 10 contingency since the unadjusted costs are the best estimates.

The shadow exchange rate for the cedi is estimated to be ₵10 - \$1. This rate was calculated by comparing the Ghanaian rate of inflation to the world rate of inflation since 1972. It is assumed that the cedi was overvalued by 25% in 1972.

Benefits and costs are projected for 20 years with no salvage value. The benefits of the project are the net incremental income flows to the country from the increased production of maize, yams, rice, cassava, and groundnuts due to the project. In order to derive a stream of net benefits, incremental costs of production are subtracted from the gross incremental revenues. The costs of the project are the ₵160,214,000 (or \$16,021,400) of the MIDAS Project (plus GOG costs) focused on the 15,200 small farmers.

Net Benefits

The incremental production of the five crops focused on by MIDAS II results from two project impacts: (1) increased yields per hectare; and (2) increased hectares under cultivation. Increased yields per hectare are estimated by adjusting downwards research trial results achieved in Ghana. Table 1 shows the yield increases expected from MIDAS by using improved inputs and practices. Over four years, yields per hectare are expected to increase by 211% for maize, 120% for rice, 73% for yams, 80% for cassava, and 39% for groundnuts.

MIDAS II is expected to reach 15,200 small farmers who own a total of 21,280 hectares. As a result of the project, these farmers are expected to increase their average size of farm from 1.4 hectares to 2.5 hectares, resulting in a total increase of 17,220 hectares under cultivation. Since only the incremental benefits due to the project are to be counted, previous production levels from hectares already under cultivation will be subtracted from projected total production levels. Total projected production levels of new hectares brought under cultivation due to the project will be counted. It is projected that by the end of the fourth year of the project all 38,500 hectares will have been reached. The expected patterns of reaching previously cultivated hectares is given in Table 2.

TABLE 1. PROJECTED YIELD INCREASES FROM MIDAS II
(lbs. per hectare)

	Traditional	Year 1	Year 2	Year 3	Year 4
Maize	2442	3980	6055	7081	7594
Yams	9900	12078	14949	16434	17160
Rice	2222	3022	4088	4355	4890
Cassava	14819	18375	23117	25488	26675
Groundnuts	2200	2464	2794	3014	3060

TABLE 2. PATTERN OF MIDAS IMPACT ON HECTARES
(previously cultivated - P, newly cultivated - N)

	Year 1	Year 2	Year 3	Year 4	Total
			Maize		
P	2800	700	2800	1820	17,400
N	3200	800	3200	2080	
			Yams		
P	2240	840	1820	1540	9,000
N	960	360	780	460	
			Rice		
P	700	308	252	560	3,900
N	800	350	288	640	
			Cassava		
P	980	280	700	1260	4,600
N	420	170	250	540	
			Groundnuts		
P	420	420	560	280	3,600
N	480	480	640	320	
TOTAL	13,000	4,700	11,290	9,500	38,500

Prices for the tradeable crops (maize, rice and groundnuts) were taken from World Bank estimates of CIF import prices. Prices for the non-tradeable crops, yams and cassava, were taken from current market prices in Ghana. These prices are listed in Table 3 and reflect the shadow exchange rate of ₵10 = \$1. The reason for using shadow prices for the output crops is that this increased production is assumed to save foreign exchange through reducing imports.

Incremental gross returns are listed in Table 4. Production is expected to level off after Year 7.

Production costs per hectare are listed in Table 5. In order to derive these costs, the price of labor was valued at ₵10 per man-day and fertilizer was valued at \$250 (₵2,500) per metric ton. These costs were then subtracted from gross returns to arrive at net income flows due to the project.

Capital Costs

The capital costs of MIDAS II that are applied to this analysis are listed in Table 6. Not included are the costs of the seed component, which is evaluated separately, and the Home Extension Unit, which is oriented toward nutrition education rather than food production. One half of fertilizer distribution costs are allocated to the project and 74% of the MIDAS Committee and USAID Administrator components (pro-rated according to the share of other MIDAS costs devoted to the Brong-Ahafo Region). All of these costs are presented in cedis using the shadow exchange rate of ₵10 = \$1 to reflect the true scarcity value of foreign exchange to the Ghanaian economy.

TABLE 3. ECONOMIC PRICES FOR MIDAS CROPS
(per metric ton)

Maize	₵1,519
Cassava	163
Yams	537
Rice	1,177
Groundnuts	3,017

Note: These prices reflect a shadow exchange rate of ₵10 = \$1.

TABLE 4. GROSS INCREMENTAL INCOMES PER CROP
(Millions of Cedis)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Maize	11.7	23.3	41.3	60.9	71.3	76.0	77.5
Yams	4.0	7.6	12.8	17.7	20.2	21.4	21.7
Rice	1.5	3.1	4.2	6.3	7.3	7.6	7.8
Cassava	0.8	1.5	2.4	3.9	4.7	5.1	5.2
Groundnuts	1.8	4.0	7.1	9.0	10.0	10.3	10.4
Total	19.8	39.5	67.8	97.8	113.5	120.4	122.6

TABLE 5. PRODUCTION COSTS
(Cedis per Hectare at Shadow Prices)

	Land Preparation	Seed	Fertilizer	Insecticide	Crop Maintenance	Harvest	Marketing
Maize	500	40	984	10	334	200	600
Yams	1035				501	300	1000
Rice	668	730	984	10	501	334	400
Cassava	635	240			501	200	400
Groundnuts	2004	100	738		100	134	440

TABLE 6. MIDAS COSTS (ECONOMIC)
(in \$1,000)*

	Year 1	Year 2	Year 3	Year 4	Year 5	
Small Farm Credit	846.1	770.6	653.1	631.1	435.2	
Extension	410.6	262.6	234.4	241.2	151.4	
Research	313.0	410.7	467.3	393.2	276.0	
Marketing	46.0	103.7	97.0	68.6	75.8	
Fertilizer Distribution	81.0	82.0	9.0	6.0	1.0	
Small Farm Inputs	2100.0	2150.0	1200.0	1250.0	1300.0	
USAID Administrator	134.9	137.3	130.2	75.4	156.0	
MIDAS Committee	311.0	3.7	3.0	2.6	0.7	
Total	4242.6	3920.6	2794.0	2668.1	2396.2	<u>16,021.4</u>

* These dollar costs were changed into Cedis for the economic analysis at the shadow exchange rate of ₵10 - \$1.

Replacement Costs

Since this analysis covers 20 years, required replacements of equipment, tools, commodities, and vehicles must be reflected in the projected stream of costs. In order to accomplish this, item-by-item projections were made for replacement costs over the 20-year period.

Government of Ghana (GOG) Contribution

The GOG contributions to the project must be included in the projected costs. These costs were restricted to the share of the GOG contribution attributable to the 15,200 farmers, as was done with the capital costs. The GOG contributions are recurrent costs that are projected over 20 years.

Rate-of-Return Analysis

In Table 7 the streams of costs are subtracted from the income stream in order to derive the flow of net benefits (costs) to the country from the MIDAS Project. An internal rate of return was then calculated for this flow of net benefits (costs) which approximated 21%.

The analysis was then carried further to determine how sensitive the rate of return is to the incremental yield assumptions. Table 8 shows that the IRR drops to 12% if the projected incremental yields are reduced by 10%, and drops to 2% if the projected incremental yields are reduced by 20%. The IRR turns negative when projected incremental yields are reduced by 22%. These results show that the IRR is quite sensitive to assumptions about incremental yields. Much depends on how optimistic one is about translating research trial yields into actual incremental yields over a wide range of small traditional farmers in the Brong-Ahafo Region.

TABLE 7. PROJECTED INCREMENTAL COSTS AND BENEFITS

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Income	19.8	39.5	67.8	97.8	113.5	120.4	122.6	122.6	122.6	122.6
Production Costs	<u>17.8</u>	<u>27.4</u>	<u>46.7</u>	<u>61.2</u>						
Net Income	2.0	12.1	21.1	36.6	52.3	59.2	61.4	61.4	61.4	61.4
Capital Costs	42.4	39.2	27.9	26.7	24.0					
Replacement Costs			1.9	4.5	8.3	7.5	15.1	11.0	12.6	20.2
GOG Contribution	<u>3.3</u>	<u>3.9</u>	<u>5.8</u>	<u>7.6</u>	<u>11.0</u>	<u>11.0</u>	<u>11.0</u>	<u>11.0</u>	<u>11.0</u>	<u>11.0</u>
Net Cash Flows	(43.7)	(31.0)	(14.5)	(2.2)	9.0	40.7	35.3	39.4	37.8	30.2
	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Income	122.6	122.6	122.6	122.6	122.6	122.6	122.6	122.6	122.6	122.6
Production Costs	<u>61.2</u>									
Net Income	61.4	61.4	61.4	61.4	61.4	61.4	61.4	61.4	61.4	61.4
Capital Costs										
Replacement Costs	27.2	13.1	10.5	14.6	20.2	15.7	11.6	12.4		
GOG Contribution	<u>11.0</u>									
Net Cash Flows	23.2	37.3	39.9	35.8	30.2	34.7	38.8	39.0	50.4	50.4

TABLE 8. IRR SENSITIVITY ANALYSIS TO DIFFERENT INCREMENTAL YIELD ASSUMPTIONS

Incremental Yields					IRR
Maize	Yams	Rice	Cassava	Groundnuts	
211%	120%	73%	80%	39%	21%
190%	108%	66%	72%	35%	12%
171%	97%	59%	65%	31%	2%
165%	94%	57%	62%	30%	0

Assumptions

The results of the IRR analysis are critically dependent upon not only the incremental yield assumptions, but also on a number of other underlying assumptions. The most critical of these are listed below.

1. Timing

The assumed timing of the incremental benefits to the project are critical to its earning an adequate rate of return. A one year delay in implementation would reduce the IRR from 21% to 15%. Greater time lags in achieving the projected incremental yields would further reduce the IRR (the above analysis assumes it takes 4 years to achieve the full increment with improved inputs and practices).

2. Viability after USAID Withdrawal

Two major issues must be considered regarding the viability of the MIDAS Project after USAID withdrawal: GOG recurrent costs and credit decapitalization. The IRR analysis assumed that these issues have no impact on the project.

Table 7 shows that after Year 5 the GOG will have to assume significant foreign exchange replacement costs as well as continued local recurrent costs. Although the rate of return to the project may be adequate to cover these costs, there is no explicit link between the project benefits and the ability or tendency of the GOG to cover recurrent and replacement costs. Continued overall foreign exchange shortages in the economy will result in continued rationing, and it is difficult to predict whether MIDAS will or will not represent a priority for the GOG in 1986.

Decapitalization of the credit component of MIDAS is a serious problem given the prospect of continued inflation rates in excess of 50% per year. Annex 4 shows almost total decapitalization of MIDAS credit by 1990 with a conservative assumption of 40% inflation, 90% repayment of loans, 5% annual growth in nominal savings, and no change in the exchange rate. This means that the project will have to depend on the Bank of Ghana to make advances to the MIDAS credit fund if it is to keep its real value (unless the interest rate is raised adequately, which is highly unlikely).

3. Labor Requirements

The MIDAS Project (and the IRR analysis) assumes the possibility of achieving a 197.3% increase in total labor and a 789% increase in hired labor on the 15,200 target farms. This will result from total labor man-years increasing from 13,285 to 39,495 and hired labor man-years increasing from 3,321 to 29,531. Amid reports of increasing labor shortages in the rural areas (see Annex 4) and decreasing labor migration from Northern Ghana and the Sahel countries, the ability of the 15,200 farmers to achieve these labor increases is at best uncertain.

4. Smuggling

The IRR analysis assumes that the improved inputs will be delivered to the targeted small farmers and used there, and will not be smuggled out of the country in exchange for hard currency or goods not available in Ghana. No data exist to test this assumption, but the financial incentive, especially for distribution of inputs, is enough to lend substantial support to the many reports of this kind of activity. The heavy subsidy on fertilizer makes this commodity particularly vulnerable to smuggling. The distance of MIDAS farmers from the border, however, may discourage many of them from smuggling, as well as the financial return to the improved inputs. It is the distribution of the inputs to the total farmers that must be very carefully monitored.

5. Incentives for Increased Production.

For all indications, the direct price impact of inflation has not adversely affected the small farmers in Ghana. In fact, the opposite appears to be the case, with food prices consistently leading the consumer price index over the last several years. Food prices are not controlled in Ghana.

The indirect effects of inflation and the associated overvalued exchange rate, however, adversely affect all Ghanaians except those fortunate enough to obtain import licenses. The widespread shortages of goods reduce the incentive to earn increased cash income. This may partly explain why good volume production has continued to decline in Ghana in spite of apparently attractive price incentives. Besides affecting farmers, these disincentives will also affect hired labor.

The IRR analysis assumes that the small farmer will respond to the possibility of increasing his cash income. If this assumption does not hold, the consequences for the project are obviously serious.

6. Exchange Rate

The IRR is relatively insensitive to the shadow exchange rate used since a change would affect both costs and benefits in the same direction. The impact would be somewhat greater on benefits since all the outputs are assumed to save foreign exchange, whereas a portion of the costs are local and therefore not affected by the exchange rates.

7. Other Assumptions

Other assumptions implicit in the IRR analysis are that the institutional and administrative capacity of the GOG will be adequate to implement the project, the infrastructure constraints, especially roads and transportation, will not present bottlenecks, and that the delays and implementation problems that impede virtually all development projects in Ghana now can be overcome.

Conclusions

The most positive assessment of the MIDAS Project that can be made is that it is possible that it will earn an adequate rate of return for the country if all the assumptions listed above hold. The list of assumptions, however, is formidable. The "Recommendations for MIDAS" paper discusses the implications of this economic analysis given varying economic and political assumptions.

ECONOMIC ANALYSIS OF THE SEED COMPONENT

In calculating the streams of costs and benefits the primary assumption was that all dollar costs of the project should be converted into cedis at the shadow exchange rate. All local costs are the same as those in Annex IV.A. The procedure was then to assume a 15% rate of return and to calculate the price of seed necessary to reach a present value of zero. The result was 490 cedis per bag. This is the opportunity cost of producing seed and is presumably the price that should be charged to the farmers. The results are presented in Table 1. These are conservative cost estimates and somewhat optimistic revenue estimates. However, even if the opportunity cost of seed is actually ¢600 per bag, the project would still have a high social rate of return. To see this let us look at the real social benefits of the project—the increase in yields.

Assuming that improved seeds, by themselves without any other changes in inputs, increase both maize and rice yields by 25%, the economic benefits are 1-1/4 bags of maize per acre at ¢150/bag or ¢187.5 or 0.0 bags of rice at ¢128/bag or ¢117. The cost of the 20 lbs of seed per acre is ¢60 less the saving of the farmers' own seed. These costs net out to ¢45 for maize and ¢48.8 for rice. The net returns per bag of seed are thus ¢1150 for maize and ¢685 for rice. If we assume that the plant will produce two-thirds maize seed and one-third rice seed, the social benefits per bag of seed is ¢995/bag. The stream of costs and benefits are shown in Table 2. The internal rate of return is 45%. This rate of return is not terribly sensitive to the assumptions.

Table 1

Year	Capital Costs At ¢10 Per \$	Recurrent Costs ¢	Total Costs ¢	Revenues At ¢490 Per Bag	Net Flows ¢
1981	36353	3112	39465	7427	(32038)
1982	6563	4045	10608	9901	(707)
1983	10300	4045	14345	9901	(4444)
1984	5017	7502	12519	15853	344
1985	5203	10373	15576	24755	9179
1986	5610	11410	17020	27231	10211
1987	900	11410	12310	27231	14921
1988	900	11410	12310	27231	14921
1989	900	11410	12310	27231	14921
1990	900	11410	12310	34360 ^a	22050

a Includes salvage value of building at ¢7129000.

Table 2. STREAM OF COSTS AND BENEFITS

Year	Social Costs	Social Benefits (000's Cedis)	Net Stream
1981	39465	12316	(27149)
1982	10608	16419	5811
1983	14345	16419	2074
1984	12519	26306	13787
1985	15576	41052	25476
1986	17020	45158	32848
1987	12310	45158	32848
1988	12310	45158	32848
1989	12310	45158	32848
1990	12310	55287	42977

ECONOMIC ANALYSIS OF THE FERTILIZER SECTOR LOAN

The assumptions for this analysis are as follows:

1. The CIF price of fertilizer is \$250/ton
2. The CIF price of maize is \$151/ton
3. The CIF price of rice is \$118/ton.

For fertilizer to generate benefits equal to its cost, one ton of fertilizer must generate an increased yield of 1.65 tons of maize or 2.12 tons of rice, net of storage losses, transport costs both of the fertilizer and of the crop, and net wastage of fertilizer.

If the farmer applies 0.43 tons per hectare, then his yield increases must be 0.717 tons per hectare of maize and 0.9 tons per hectare of rice, then the percentage increase in yields for maize must be 59.8% and for rice, 101.3%. It must be emphasized that these are net figures, i.e. if there is a 10% loss of fertilizer due to maldistribution or bad timing, and a 10% storage loss of output, and if the transport costs from the port to the farm are 20% of the value of fertilizer, and the transport costs from the farm-gate to the market are 20% of the value of output, the necessary gross yields are even greater. The same would be true if the price of fertilizer rises relative to the price of grains. The impact of these contingencies are presented in the following table in terms of required increases in yields for fertilizer to be effective in social terms.

SENSITIVITY ANALYSIS: BREAK EVEN POINT FOR GROSS YIELDS' INCREMENTS DUE TO APPLICATION OF FERTILIZER UNDER EACH OF THE ASSUMPTIONS BELOW

	Maize	Rice
No storage loss, no transport cost, no fertilizer loss, constant relative price between fertilizer and food crop	59.8%	101.3%
10% storage loss	66.4%	112.6%
20% storage loss	74.7%	126.7%
10% loss of fertilizer	65.9%	112.5%
20% loss of fertilizer	74.2%	126.5%
20% transport cost each	89.0%	151.8%
10% storage loss; 20% transport cost; 10% fertilizer loss; 20% increase in relative price of fertilizer	129.2%	220.5%

If these yields cannot be achieved then it is cheaper to import food than to import fertilizer. More drastic assumptions would increase the required yield increments.

The following fertilizer sensitivity analysis represents USAID, Ghana's supplement to the same type analysis completed by AID/W. Price application rates and other cost of distribution inputs are believed to be more representative of the actual situation in Ghana as compared to the AID/W economic sensitivity analysis.

1980 Average CIF Cost Fertilizer ^{1/}	- \$365/mt
1980 World Price Maize	- \$151/mt
1980 World Price Rice	- \$122/mt

For fertilizer to generate benefits equal to its cost then one ton of fertilizer must generate increased yields of 2.42 mt. maize and 3.0 mt rice.

1. Assumptions for MIDAS II FY81 Fertilizer Use:	=	<u>Per/Acre</u>
(1-1) typical fertilizer application for maize and rice is 4 bags (440 lbs)/acre	=	\$ 73.00
(1-2) transport costs one way, 18.9% of cost of fertilizer or	=	13.80
(1-3) storage and handling costs at 10% of cost of fertilizer	=	7.30
(1-4) fertilizer loss in transport, storage and pilferage - 15% of the cost of fertilizer	=	10.95
(1-5) increase in relative price of fertilizer to maize and rice at 20% of the cost of fertilizer	=	<u>14.60</u>
Total cost fertilizer/acre	=	<u>\$119.65</u>

2. Sensitivity Analysis, fertilizer application breakeven point summary:
(2-1) Based upon total fertilizer costs of \$119.65/ac. and traditional maize production at 770 lb/acre; maize yields will have to increase 166% (1248#) for maize fertilizer cost effectiveness to breakeven.

(2-2) Based upon the same total fertilizer costs at \$119.65/acre and traditional irrigated paddy rice yields at 1,440 lbs/acre, rice yields will have to increase by 149% (2160#/ac.) for rice fertilizer cost effectiveness to breakeven.

3. Traditional and non-traditional yields, fertilizer application rates/acre for maize and rice and transport costs were furnished by the Ministry of Agriculture.

4. GOG sells fertilizer at the distribution outlets for \$10/50kg bag throughout Ghana. This amounts to 87.8% subsidy by GOG.

^{1/} Average for (15-15-15) at \$400/mt and (21-0-0) at \$330/mt. (CIF Price landed).

RECOMMENDATIONS FOR MIDAS II

Recommendations concerning MIDAS II can be made on two different levels: first, on strictly economic grounds; and second, on the assumption that a minimum amount of financial assistance should be forthcoming to support the newly elected civilian government.

On strictly economic grounds, the recommendations would basically follow a go-slow approach with a major objective in the first years to fill some of the missing information gaps, e.g., the expected incremental yields due to the MIDAS package, the extent of the labor shortage, the need for credit, etc. The small farm research component would be the core of the project, with the MIDAS package of inputs carefully delivered and monitored to a limited number of farmers. The seed component could go ahead as designed since it appears to be an economically sound project in itself. Of the other components, marketing is the most thoroughly researched and could probably go ahead relatively faster. Extension could be allowed to go as quickly as the availability of qualified and willing extension workers will allow. Extension could focus more on improved practices rather than inputs in the early years.

The credit and fertilizer components are the areas where USAID should be especially careful, as well as with the other commodity import components of the project. Until the need for credit is better documented and the yield response to fertilizer better established, as well as the other assumptions of the IRR analysis validated, these two components should be focused on a more limited number of farmers and closely monitored.

A convenient way to accomplish this would be to focus these components only on the Atebubu District for the first two years. This is the district for which USAID has the most complete information to date. The Stanford study has provided good baseline data for marketing in Atebubu. Other information that should be collected during the first two years would be:

1. yield response to the MIDAS improved inputs and practices, including the timing of this response;
2. incremental production costs required to achieve the desired yield and acreage increases;
3. adequacy of labor availability, and implications for degree of appropriate mechanization;
4. feasibility of getting improved inputs to farmers and having them adopted, which is related to problems of:
 - (a) smuggling;
 - (b) farmers' incentive to increase production for increased cash income;
5. the need for and use of credit; and
6. other implementation problems and their impact on the progress of the project.

On the basis of this information, USAID will be better able to make a determination about the economic advisability of expanding the project to the remainder of the Brong-Ahafo Region. Atebubu represents 3,200 of the 15,200 target farmers of the MIDAS project. Reducing the focus of MIDAS to 21% of the original target group for the first two years would significantly reduce the costs and risks of the project and provide a more economically sound basis for decision about whether and how to expand

to the rest of Brong-Ahafo.

If the basic assumption regarding MIDAS is changed from strictly economic criteria to an assumption that a minimum amount of assistance must be transferred to Ghana over the next five years, then the analysis must change to an evaluation of the most productive type of assistance to transfer given the total required amount. The decision, then, is basically between MIDAS on the one hand and some kind of fast-disbursing assistance (such as a sector loan or PL 480) on the other.

Given the current economic condition and policy framework, MIDAS should be preferred to the alternative of transferring all assistance on a fast-disbursing basis. The rationale for this judgment is that MIDAS might be successful and generate some long-term and self-sustaining improvements in Ghana's agricultural sector. Strict balance of payment support, on the other hand, will be largely wasted within the current policy framework, and will be counterproductive to the extent that it helps the GOG postpone necessary policy reforms.

If, however, the GOG does undertake serious economic policy reform, including at least devaluation and budgetary restraint, the balance of assistance should shift to seizeable and timely support of the stabilization program through fast-disbursing assistance. In this case, there would be no reason not to shift back to strictly economic criteria for MIDAS, since politically adequate amounts of assistance could be productively transferred through fast-disbursing channels.

Under the assumption of no basic change in GOG policies and a U.S. determination to go ahead with the total MIDAS project, a number of

recommendations can be made to minimize the possibility of failure. The IRR analysis demonstrates that it is possible for MIDAS to earn an adequate rate of return, but this conclusion must be severely qualified by recognizing the assumptions that must be made to obtain this result. Adequate data do not exist to place probabilities on the uncertainties related to the assumptions. It is enough cause for concern, however, to realize that the failure of any one of these assumptions could jeopardize the success of the project. The following recommendations are made to minimize the possible adverse impacts of the failure of these assumptions.

1. Even with the full MIDAS project, an attempt should be made to gather the types of information suggested for Atebubu on page 1 and 2 so that the project can be adjusted if necessary;
2. assurances should be obtained through covenants in the project agreement that the real value of MIDAS credit is maintained either through Bank of Ghana advances or interest rates increases, preferably the latter;
3. assurances should be obtained that subsidies will be removed on inputs, especially fertilizer, so that the financial burden on the GOG will be reduced and the incentive to smuggle lessened;
4. assurances should be obtained that the GOG will continue to cover recurrent and replacement costs of MIDAS after USAID withdrawal from the project; and
5. strict controls on the distribution of inputs to ensure that they reach the intended small farmers.

SUMMARY SOCIAL SOUNDNESS ANALYSIS

Poverty dominates contemporary Ghanaian rural life. A reason for this poverty is an almost total neglect of the small farmer who still uses largely pre-colonial techniques while experiencing rapidly escalating living costs. MIDAS II, consisting of six components, attempts to relax the grip of rural poverty, especially in the developmentally neglected Brong-Ahafo Region, by making possible changes in the quantities and types of production factors available to small farmers, while reducing marketing costs.

Five MIDAS II components assist small farmer production. A final result of these components should be increased farmer income, an indicator of which is the projected 22% IRR for a target population of 43,000 Brong-Ahafo farmers involved in the inputs and services plus credit activities and 17,000 additional farmers having access to inputs and services other than credit. This cost/benefit ratio should result from increased areas farmed (an estimated 82%) and regional volume productivity (with yield increases in four years of 211% for maize, 120% for rice, 73% for yams, 80% for cassava, and 39% for groundnuts. This includes production increase per unit of land and from average farm expansion from 3 1/2 to 6 acres). Alterations in productivity and areas farmed will result from operation of MIDAS II¹. The Seed Multiplication and Fertilizer components will provide inputs previously unavailable to small farmers with the capacity to dramatically increase yields. The Credit component will permit farmers to hire the labor necessary to increase farm-size, as well as to purchase seeds and fertilizer. The Extension component will communicate the knowledge and skills required to efficiently manage new inputs, while the Small Farms Research component will assure a stream of innovations to further enhance productivity. MIDAS II, thus, can provide resources needed for greater production and productivity necessary to generate increased income for the rural population.

The marketing component is designed to test removal of certain marketing constraints, identified during MIDAS I, creating conditions for more efficient marketing and increased income for small farmers and for reduced consumer food prices, which--as food is a major component of rural and urban poor household budgets--will release income for additional consumption purposes.

Hence, MIDAS II is designed so that a positive benefit stream should impact upon the poor target population mandated by 'New Directions' legislation. With respect to Brong-Ahafo, the issue is clear. Without MIDAS II, there is no foreseeable possibility of agrarian evolution. With a successful MIDAS II, a real possibility exists--first, of improved rural welfare; second, of a replicable model for small farmer agrarian innovation desperately needed and presently lacking within Ghana.

1. These figures are derived from the MIDAS II Economic Analyses

Receptivity to Agrarian Innovation

At the turn of the 20th century Ghanaian small-farmers migrating from the Akwapim Ridge to plant cocoa farms self-initiated one of the more remarkable increases in agricultural production ever experienced. No significant target-population cultural constraints within Brong-Ahafo have been identified which would inhibit agricultural innovation. Farmers appear motivated to experiment with new techniques.

However, yield and acreage increases required for MIDAS II to attain targeted outputs depend upon extensive farming-system changes including innovation in seed types, labor quantities, soil nutrient replenishment techniques, cropping patterns, and weeding frequencies. The target population innovation rate may have to be higher than those experienced in other West African agricultural projects for these changes to occur in 4 years among the 43,000 farmers in the inputs and services plus credit activities and an additional 17,000 having access to inputs and services other than credit.

Potential Consequences

Analysis concerning benefit incidence, asset distribution, spread effects, and participation reveals:

- (1) Benefit Incidence and Asset Distribution-- MIDAS II inputs and services could be disproportionately distributed to advantaged population segments. Should this occur conditions reducing benefit incidence and skewing asset distribution (especially of land) would exist.
- (2) Spread Effects--Potential for rapid agrarian innovation has been identified provided the following conditions are satisfied:
 - (a) a timely and adequate supply of inputs and services to the target population;
 - (b) inputs and services function as expected;
 - (c) farm production costs and farm-gate prices continue to provide attractive profit margins;
 - (d) marketing, especially transportation, bottlenecks are relaxed;
 - (e) farmers extensively alter their farming systems.

- (3) Participation--MIDAS II is alert to the value of participation during implementation. Attention should be paid to its institutionalization.

Potential Constraints

Two sets of factors could effect MIDAS II's feasibility:

- (1) Prevailing macro-economic conditions--hyperinflation, unrealistic exchange rates, severe shortages of basic consumer and capital commodities, economically-induced instability--can prevent, disrupt, or deflect the flow of MIDAS II inputs and services, especially extension.
- (2) Fragile rural-outreach institutions may experience difficulty distributing MIDAS II inputs and services to their intended consumers.

Positive consideration of MIDAS II is nevertheless recommended because:

- (1) GOG has expressed commitment to greater reliance upon market mechanisms, democratic processes, and targeting benefits to rural poor. MIDAS II will provide resources to strengthen this resolve.
- (2) MIDAS II's target population delivery system, based upon a monitoring program, will facilitate distribution of inputs and services to the intended target population.

ROLE OF WOMEN IN THE MIDAS PHASE II PROJECT

As designed, each of the sub-components of MIDAS II shows enormous potential for positively benefiting rural women in the Brong-Ahafo Region. Women play a crucial role in the entire food chain of the rural community in food production, processing, preservation, marketing and consumption. A large percentage of the women in the area cultivate their own fields, in addition to providing between 40-60% of total family agricultural labor. They help in planting, weeding, fertilizer application and harvesting, and are almost solely responsible for the processing and preservation of the crops. Almost every woman grows a vegetable garden. In the Atebubu Region, women wholesalers dominate the yams and cassava trade. Given women's significance in agricultural production and marketing, the MIDAS Project, to attain goal level targets, must focus much of its attention on women. Successful performance of the extension service is the key to women enjoying project benefits, by insuring access to MIDAS credit, fertilizer, improved seed varieties and cultivation techniques.

a. Seed Multiplication

In addition to food crop seed multiplication, the Ghana Seed Company will provide and distribute vegetable seeds. During 1979, the GSC produced and distributed 4,000 pounds of okra, hot pepper, sweet pepper, garden-egg and tomato seeds. In addition, they distributed imported vegetable seeds. On the basis of anecdotal evidence in Atebubu, the seeds were sold mostly to women.

Vegetables are grown either in kitchen gardens, or are inter-cropped with groundnuts, cassava, rice and yams. Vegetables augment the farm family's diet when added to sauces. The surplus is marketed by the women, providing them with a source of income.

It is expected that the GSC will increase its own production of vegetable seeds and will improve its distribution network to make seeds easily available to growers on a timely basis.

b. Small Farmer Credit Expansion

The small farmer credit sub-component will benefit women small farmers if the extension service is aware of the special constraints faced by women. Women farmers usually own two acres or less of land. The vast majority of women farmers are illiterate and reluctant to approach government credit facilities. According to anecdotal evidence, if they do approach credit facilities, women are often ignored and discouraged from applying. One study showed that women farmers tend to borrow money either from female money-lenders (wholesalers) or from their own families.

The extension worker responsible for production credit information must be specially aware of women farmers' handicaps. The extension worker (1) should organize village women farmers into small groups so they can more easily obtain credit. It has been shown that although women do not like to pool land resources in cooperatives, they will collaborate in order to obtain inputs and credit; (2) the extension worker must take the necessary time to explain the borrowing process and its repayment schedules to avoid confusion and to encourage women credit applicants. If the above are done, women farmers should benefit as do men. Again, it is imperative that a monitoring system be established to insure women's accessibility to credit.

c. Fertilizer

The fertilizer component of the supportive agricultural sector loan can benefit women if they are included in its demonstration and distribution network. This means that a fertilizer program by extension workers targeting women must be institutionalized. Extension workers should work with groups of women farmers, for both distribution and demonstration purposes. In the smaller farms, women usually do the fertilizer application on their husbands' farms, as well as use fertilizer on their own plots. Hence, teaching women proper procedures for fertilizer application will assure better crop yields for all.

d. Small Farms Systems Research

Both men and women small farmers will likely benefit equally from the research findings providing that the new information and technologies be disseminated to all farm family members. The applied research dealing with sociological/cultural factors affecting adoption of new practices and technology, extension methods, and on farm storage can have particular relevance to women.

The study results will be analyzed and directly feed into the extension worker's in-service training program. It is important that both men and women extension agents receive regular and frequent in-service training to update their skills. Continuous analysis of research results will enable project modifications as appropriate.

e. Marketing

In general, Ghana's market women dominate food crop trade in yams, cassava, and vegetables. In the Atebubu area, 66 of the 87 yam wholesalers in the Yam Sellers' Association are women. The marketing sub-component which will offer loans to traders for working capital, provide a service center for maintenance and repair of market-service transportation, and upgrade the Atebubu District Markets' facilities will benefit market women as well as men. The ADB credit program, which given marketing credit to traders, awards well over 50% of its loans to women. Given this record, it seems very likely that women traders will continue to benefit from the marketing interventions.

f. Extension Demonstration

Extension is the key to the successful integration of women in the project. Unless extension agents specifically target information to women farmers and farm laborers, socio-cultural factors might limit women's access to project benefits, to help women better fulfil their household responsibilities as food processors and consumers, and taking into consideration the socio-cultural constraints placed on male extension agents in their dealings with women farmers, the project proposes the following:

(1) organize women into groups for obtaining credit, and receiving inputs. Attention should be paid to the existing extended family links, urging women to form their own groups among their friends;

(2) work with the Home Extension Unit of the MDA, encouraging women farmers, farm laborers, and home managers to utilize improved practices in:

- (a) nutrition through production of foods rich in protein and vitamins and using them in the family diet;
- (b) placing trial demonstrations on women's farms and/or backyard garden;

- (c) storage and preservation techniques to reduce losses and to extend season availability;
- (d) extending information and techniques on improved management of the farm and home resources;
- (e) introducing and demonstrating appropriate technology; and
- (f) establishing demonstration homes.

(3) Monitor closely the performance of the extension and home extension services to insure that women are being reached.

ANNEX V - A IMPLEMENTATION SCHEDULE - (MIDAS - PHASE II)

<u>Project Component</u>	<u>Action Agent(s)</u>	<u>Event</u>	<u>Date to be completed</u>
(Project Documentation/ Authorization and Evaluation)	USAID AID/W GOG	PP completed	July 1980
"	"	Project authorized	Sept. 1980
"	"	Project (Loan/Grant) Agreements signed	Sept. 15, 1980
"	GOG	Initial CPs met	November 1980
Evaluations	USAID GOG	Annual	October 1, each year 1981 - 1984
"	"	Mid-Phase II	March 1983
"	"	Final	October 1985
<hr/>			
SMALL FARMER MARKETING	GOG	ADB authorizes trader loan disbursements	May 1980
	GOG/ USAID	UST begins market/trader data collection	April 1980
	GOG	ADB completes hiring- marketing coordinator	July 1980
	GOG/ USAID	All administrative arrange- ments for Atebubu mechanical workshop completed	July 1980

<u>Project Component</u>	<u>Action Agent (s)</u>	<u>Event</u>	<u>Date to be completed</u>
Small Farmer Marketing (Continued):	GOG/ USAID	Market Coordinator completes proposal on market facilities improvements	November 1980
	GOG/ USAID	First annual evaluation of the marketing activities completed	October 1980
	GOG/ USAID	Pre-fab components for mechanical workshop arrive Ghana	January 1980
	GOG/USAID	Equipment and spare parts for mech. workshop arrive Ghana	February 1981
	GOG/USAID	Short-term participant training for ADB staff engaged on the marketing activity begins	June 1981
	GOG/USAID	Mechanical workshop completed, staffed and operational and UST begins monitoring of service center	May 1981
	GOG/USAID	Second Annual evaluation of the marketing activities completed. Recurrent event through life of project.	October 1981
	USAID	Extend UST and ADB Grant Agreements with respect to their involvement in project	July/October 1981
	USAID	PIO/T extending evaluation team contract	October 1981

<u>Project Component</u>	<u>Action Agent(s)</u>	<u>Event</u>	<u>Date to be completed</u>
SMALL FARM CREDIT:	USAID/GOG	Vehicles and equipment for first 19 credit facilities arrive in Ghana	April - June 1980
	USAID	Credit Advisor replacement arrives in Ghana	May 1980
	USAID/GOG	Five (5) participants depart for U.S.	Sept./Oct., 1980 thru 1985
	GOG	BOG advance to ADB -- repeats annually to end of project	October 1980
	USAID/GOG	PIO/Cs for 17 new credit facilities. (Office equipment vehicles and motorcycles)	November 1981
	USAID/GOG	PIO/C for ADB training Center (annual supply requirement)	January 1981 thru 1985
	GOG	Five (5) new credit facilities established in Brong-Ahafo Region	Oct. 81 - Jan. 82
	GOG	Seven (7) new credit facilities established in Brong-Ahafo Region.	Feb/Oct. 1983
	USAID	PIO/T for 2-year extension to contract-credit advisor	October 1981 and October 1983
	AID/W	Project Evaluation	October, 1983
	GOG	Five (5) new credit facilities established in Brong-Ahafo Region.	Feb/Oct. 1984

<u>Project Component</u>	<u>Action Agent(s)</u>	<u>Event</u>	<u>Date to be completed</u>
SMALL FARM RESEARCH	IITA/USAID	Establishment of IITA Contractors in Atebubu District, Brong-Ahafo Region	July/Sept. 1980
	USAID	Additional funds for year two of IITA Contract (PIO/T Amend.)	January 1981
	GOG/USAID/IITA	Processing of one MSc. level long and short-term senior technical training funded under the IITA contract completed	July 1980
	GOG/USAID/UST	Two long-term graduates to receive MSc. training depart for the U.S.	September 1981
	USAID	Completion USAID residential quarters in Atebubu	January 1981
	IITA/GOG/USAID	Organize and implement year one of Small Farm Survey	January 1981
	USAID	Complete USAID-funded warehouse and maintenance shop	July 1981
	USAID	Fund 3rd year of IITA contract (PIO/T amendment)	January 1982
	GOG	Completion of 3 GOG senior staff houses/offices/laboratories	January 1982
	GOG/USAID	PIO/Cs vehicles, commodities, equipment, spares and irrigation equipment and a firm order placed.	January 1982

<u>Project Component</u>	<u>Action Agent(s)</u>	<u>Event</u>	<u>Date to be completed</u>
Small Farm Research (Continued)	IITA/GOG/USAID	Implement year two of Small Farms Survey.	January 1982
	USAID	PIO/T extend IITA contract through FY 1985	January 1983
	GOG/USAID	PIO/Cs vehicles, commodities, equipment and spares and firm order placed	January 1983
	IITA/GOG/USAID	Implement years three, four and five of Small Farms Survey.	January 1983 (January 1984) (January 1985)
EXTENSION/DEMONSTRATION SUB-COMPONENT:	USAID	USAID Extension Agent arrives	Sept. 1980
	USAID/GOG	PIO/T for 4 short-term participants	March 1981 (repeats annually to 1984)
	GOG/USAID	10 sub-districts in the Brong-Ahafo Region identified for special concentration	November 1980 (repeat annually)
	USAID	PIO/Cs vehicles, motor-cycles, bicycles	November 1980 (repeats annually to 1984)
	USAID	PIO/Cs demonstration equipment, visual aids	November 1980
	PC/USAID	PC Volunteer arrives Wenchi Farm Institute.	January 1981
	GOG	Home Extension Agent assigned to Brong-Ahafo Region. Will increase annually as personnel available	January 1981

<u>Project Component</u>	<u>Action Agent(s)</u>	<u>Event</u>	<u>Date to be completed</u>
EXTENSION/DEMONSTRATION SUB-COMPONENT: (Cont'd)	GOG/USAID	40 Farm-level demonstrations initiated in 10 subdistricts (will increase at rate of 4 demonstration/subdistrict as Extension Services expand annually)	Apr. 1981 (repeats annually to end of project).
	GOG/USAID	Training of 20 Sub-District Extension Agents initiated (will increase annually as Extension Services expand to additional sub-districts)	February 1981
	GOG/USAID	First of 5 Home Demonstration houses completed. One house to be constructed annually	May 1981
	USAID	PIO/T for 2 long-term participants	April 1981
	GOG/USAID	Field trials at Wenchi supported	April 1981 - November 1981 (repeats annually)
	GOG/USAID	Farm Demonstration results analysed.	January 1982 (repeat annually)
	USAID/GOG	PIO/T for long-term participants	April 1981 and April 1982
SEED MULTIPLICATION	GOG	Begin construction Winneba Regional Seed Center	Sept. 1980
	GOG	Complete construction Winneba Regional Seed Center	July 1982
	GOG/USAID	Seed Equipment for 2 Centers arrives	Sept. 1980

<u>Project Component</u>	<u>Action Agent(s)</u>	<u>Event</u>	<u>Date to be completed</u>
Seed Multiplication: (Cont'd)	USAID	PIO/Ps for 2 short term and 1 long-term participants	April/Sept. 1980
	GOG	Ghana Seed Inspection Service (GSIS) established HQ + 2 Branch Offices	Jan 1981
	GOG/USAID	Seed drying/storage equipment arrives	Jan 1981
	GOG/USAID	Seed testing equipment arrives	September 1980
	USAID/GOG	PIO/Cs vehicles and motorcycles	October 1980
	USAID/GOG	PIO/Ps 3 long-term participants	January 1981
	USAID/GOG	PIO/Ps 3 short-term participants	March 1981 (repeats annually)
	USAID/GOG	PIO/C vegetable seeds	March 1981 (repeats annually)
	GOG	Begin construction, Kumasi Regional Seed Center	June 1981
	USAID/GOG	Vehicles/Motorcycles arrive.	Aug. 1981
	USAID/GOG	Vegetable seed arrive	Sept - Dec 1981 (repeats annually)
	GOG	Kumasi Regional Seed Center completed	June 1982
	GOG	Begin construction, Tamale Regional Seed Center	June 1983

<u>Project Component</u>	<u>Action Agent(s)</u>	<u>Event</u>	<u>Date to be completed</u>
Seed Multiplication (Cont'd)	USAID/GOG	PIO/C for 3rd. Tamale Regional Seed Center	September 1983
	GOG/USAID	Equipment for Tamale Regional Seed Center arrives	September 1984
	GOG	Tamale Regional Center completed	January 1985
SMALL FARM PROJECT LOAN EQUIPMENT AND COMMODITIES	USAID/GOG	Issues PIO/Cs	January 1980 (procurement cycle continues annually)
SMALL FARM EQUIPMENT/ INPUTS	USAID/GOG	PIO/Cs issued	February 1 each year 1981 through 1985
INSECTICIDES/PESTICIDES	USAID/GOG	IO/Cs issued	February 1 each year 1981 through 1985
VEGETABLE SEEDS	USAID/GOG	PIO/Cs issued	February 1 each year 1981 through 1985

PROCUREMENT PLAN

I. RESPONSIBILITIES

The Ministries of Agriculture, Finance and Economic Planning, the Bank of Ghana, the Agricultural Development Bank, the Ghana Seed Company, the Ghana Fertilizer Company and the University of Science and Technology are the implementing agencies for MIDAS II. However, the MIDAS Project Executive Committee, through coordinating and integrating the various entities has the primary implementing responsibilities for the six main components of the project.

It is anticipated that MIDAS II will utilize the services of the AAPC, New York to act as its procurement services agent (PSA) under a contract still in force between the GOG and AAPC. Procurement will be in accordance with AID Regulation I practices. Proprietary Procurement will be by Mission-issued Direct Letters of Commitment to respective suppliers.

II. EQUIPMENT LIST

A. Seed Multiplication Component (Tamale Unit) - (Loan)

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$000)</u>
1	Clipper 4-Screen, dustless type air screen cleaner	H-454	\$18.3
2	Clipper air screen cleaner with motor @ \$7,800 each	27	15.6
1	3 Screen air screen cleaner with screen and motor	354	14.6
2	Bucket elevator 34' w/ accessories @ \$4,867/unit	C2-175	9.7
1	Seedburo aluminum frame elevator w/ chain and drag flights w/ 3/4 hp electric motor	178	1.5
1	Gravity table, Oliver model, capa- city of approximately 5,000 lbs and spares	160A	24.4
1	Seed treater, Gustafson model 4.5 ton/hour capacity	Model B	5.0
3	Bag conveyor, portable, 24" belt width, 24 ft. length similar to Burrows Model NOR 18-19 @ \$3,900 ea	NOR-18-19	11.7

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$000)</u>
1	Combined sheller-cleaner w/capacity of 400-500 BPH, incl. motor & spare parts for maize shelling	2A	60.9
1	Air compressor, Sears	30G 17578N	1.2
2	Blower, portable 220/50H 1 phase complete w/ nozzle and holding handle \$650 ea.	Seedburo #98800	1.3
2	Vacuum cleaner, Tornado 1-1/2 HP w/ accessories @ \$1,950 ea	Seedburo #98890	3.9
2	Platform scales, Fairbank-Morse w/ double beam, metric at \$1,200 ea.	Seedburo 41-3132	2.4
3	Fishbin portable bag closers incl. tools, extra needles and spares @ \$1,333 ea.	Seedburo "D"	4.0
1	Disc separator, Carter-Day size 2520 w/ motor and spare parts (for rice)	Style BU-3	29.2
1	Motor truck scale, Fairbanks w/ Model 50-5509 registry beam, metric	11-3153A	34.3
4	Uniform indent cylinder separator Carter-Day, Model No. 2, w/ sizes 23, -6, 28, 32, S-2 cylinders each separator (for maize) @ \$6,100 ea motor		24.4
3	Exhaust fans, 4,000 CTM, 30-inch, wall type at \$1,800 ea.		5.4
7	Bins, surge or holding type, floor mounted above equiv 2 ea., 529 bushel capacity 1,000 bushel; 5 ea, 400 bushel capacity	Seedburo	24.4
2 prs	Wagon-type dryer units for rice and maize drying incl. electric burner (heater) max. 8 tons per wagon @ \$24,350 each pair		48.7

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$000)</u>
2	Cyclone-dust collector burrows type	8-8012	9.7
1 lot	Misc. equipment and accessories for IITA, above		36.6
1	Generator, 50 KVA	CAI or equiv.	48.7
1	Bucket elevator 38' w/ accessories at \$5,600/unit		5.6
1	Bucket elevator 32' w/ accessories at \$4,900/unit		4.9
2	Bucket elevators 30' w/ accessories at \$4,850/unit		9.7
2	Bucket elevators 26' w/ accessories at \$4,850/unit		9.7
4	Grain storage bulk bins, farm type 20' diameter x 20' height 5,000 bushel capacity @ \$6,900 ea.		24.4
1	36' 8 in. diameter, crew type transport auger w/ dump hopper, electric motor transportable	Seedburo	3.7
1	21' utility auger, screw and tube 8' diameter, electric 5 hp motor	Burrows	<u>2.4</u>
	Sub-total		496.3
	Misc. supplies and equipment: for seed testing laboratories; germination paper; tetrazolium power for T2 tests; glassware; replacement light bulbs and tubes for analytical lamps magnifiers; tweezers, other expendable laboratory supplies		3.0
	Soil testing kits and supplies: one kit ea. Winneba, Ho, Tamale Foundation seed farms; one kit production division, Ghana Seed Company headquarters; expendable supplies for 5 years		1.5
10	Metal rotary dusters		<u>0.3</u>
	Sub-total		4.8

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$000)</u>
C. <u>Farm Machinery (Grant)</u>			
4	Mowers, rotary bushog		7.1
3	Planters, 4-row, plate type trailing w/ fertilizer attach.	IH	29.4
4	Cultivators, front-mounted 4-row for IH tractors	IH	25.0
5	Tractors, diesel, 95hp	IH	312.8
4	Disc plows - 4 bottom plows w/ spares		21.5
1	Low boy, Tilting Trailer, 6-ton		5.2
1	Tractor Model 140, PTO, 3-pt hitch	IH	8.8
1	Cultivator, one row mtd for IH 140 tractor	IH	1.8
1	Disc Plows, 3-pt hitch for IH 140 tractor	IH	1.4
1	Fertilizer spreader, 300# capacity, 3-pt hitch, mtd. PT		0.6
1	Front mtd. comb. planter, tool bar assembly, for IH 140, various planter plates for maize		1.4
1	Blade, 3-pt hitch, for IH 140, hardened steel 6 ft.		0.5
1	Disc harrow for IH 140 tractor, double tandem, pull type, 7 ft.		2.3
1	Two-wheel tractor w/ totovator, 12hp		1.9
1	Sprayer, w/ motor, portable on wheels, 40 gal. w/ 50 ft rubber hose, nozzles		0.6
5	Planet, Jr. hand cultivators, "wheel hoes"		<u>0.5</u>
	Sub-total		420.8

ANNEX V - B

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF (\$000)</u>
<u>D. Vehicles (Grant)</u>			
6	7-ton diesel trucks @ \$32,450 ea.		194.7
5	Crew cab pickups 3/4 ton diesel @ \$15,160 ea.		75.8
2	10-ton trucks at \$33,700 ea		67.4
	Spare and replacement parts		6.7
2	Forklift gasoline or diesel @ \$12,650 ea.		25.3
4	Vehicles w/ spares @ \$15,000 ea (Year 2 procurement)		<u>60.0</u>
	Sub-total		430.3
<u>E. Equipment Maintenance (Loan)</u>			
3 sets	Mechanics tools @ \$15,200 ea.		45.6
3 sets	Shop equipment @ \$35,733		<u>107.2</u>
	Sub-total		152.8
7	Adding machines @ \$714 ea.		5.0
8	Typewriters ^{1/} @ \$713 ea.		5.7
10	Gram scales, 610 grams capacity @ \$220 ea.		2.2
1	Photocopy machine		3.6
7	Duplicators, paper, ink (Gestetner) @ \$900 ea.		6.3
10	Air conditioners 13,000 BTU @ \$580 ea.		5.8
	Misc. supplies		3.6
7	Trans-receiver radios @ \$5,371 ea.		37.6

1/ Off-shore non-U.S. source/origin procurement.

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$00C)</u>
F. <u>Sales Promotion Materials</u>			
	(\$3,600 increasing each succeeding year as follows:) \$1,014 yr 2; \$1,118 yr 3; \$1,222 yr 4 and \$1,316 yr 5 to help create Ghana Seed Company image country-wide including, but not limited to, caps with logo signs, pens, miscellaneous		<u>8.3</u>
	Sub-total		78.1
G. <u>Pesticides (Loan)</u>			
(a)	Insecticides		0.4
	bacillus thuringiensis		0.4
	carbaryl		2.7
	diazinon		2.7
	malathion		1.8
	phostoxin (fumigate)		3.1
(b)	Herbicides		7.2
	alachlor		7.2
	atrazine		7.2
	glymosphate		---
			32.7
	Requirements for 5 years are as follows: \$32.7 yr 1; \$36.7 yr 2; \$40.6 yr 3; \$44.2 yr 4 and \$47.8 yr 5.		
		Subtotal	<u>202.0</u>
H. <u>Seed Center - Electrical Installation (Loan)</u>			
	Electrical equipment, installation fitting:		
	1st year, 2 units @ \$193,900		387.8
	3rd year, 1 unit @ \$97,300		97.3
	Spare parts		<u>48.4</u>
	Sub-total		533.5
I. <u>Seed Center - Raw Materials (Loan)</u>			
	Polypropylene pellets for the manufacture of seed bags		

	Subtotal		500.2

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$000)</u>
<u>J. Seed Laboratory Testing Equipment - Tamale (Loan)</u>			
1	Germinator, dark type, cabinet style, one compartment, fully automatic	Seedburo	2.2
1	Moisture meter, dielectric	Seedburo	0.8
2	Moisture meter, portable @ \$500 ea	Seedburo	0.9
1	Sample divider, Boerner	Seedburo	0.4
1 set	Seed dockage sieves (2)	Seedburo	0.2
1	Torsion balance, 120 gram capacity 0.1 g. readout	Seedburo	0.3
1	Gram scale, 610 grams capacity	Seedburo	0.1
2	Electric lamp w/ magnifier @ \$100 ea. analytical misc other lab equipment and supplies	Seedburo	0.2
		Seedburo	<u>0.8</u>
	Sub-total		5.9
<u>K. Vegetable Seeds (Loan)</u>			
	Vegetable seed (annual imports for 5 years: \$233.2; 263.9; 317.5; 369.1; 429.3		<u>1613.0</u>
	Sub-total		1613.0
<u>L. Insecticides, Pesticides, Herbicides (Loan)</u>			
	Annual imports for 5 years: \$89.3; 151.7; 223.6; 304.6; 395.0		<u>1164.2</u>
	Sub-total		1164.2
<u>M. Ghana Seed Inspection Service (Grant)</u>			
	Miscellaneous supplies and equipment for seed testing laboratories:		
	Germination paper; atrazolium powder for T2 tests; glassware; replacement light bulbs and tubes for analytical lamps; magnifiers; tweezers; other expendable laboratory supplies		3.0

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF (\$000)</u>
3	Pick-up trucks w/ spares @ \$14,433 ea.		43.3
4	Motorcycles ^{1/} w/ spares \$2,200 ea.		8.8
	Sub-total		55.1
N. <u>Small Farm Credit (ADB & BOG) Facilities (Over a Five-Year Period) (Grant)</u>			
18	Vehicles w/ spares (7, yr 1; 5, yr. 2; 3, yr 3; 3, yr 4) at \$94,330; \$74,980; \$49,240 and \$53,360 for years 1-4 respectively.		271.9
1	Armoured (bullion) truck w/ spares (Year 1) (loan)		41.3
	(Seven items below each 6, yr. 1; 5, yr. 2; 2 yr. 3; 2, yr. 4)		
15	Motorcycles w/ spares		36.5
15	Calculators		12.1
15	Typewriters ^{1/} (18" manual)		12.1
15	Typewriters ^{1/} (28" manual)		14.8
15	File cabinets w/ lock, fireproof		13.4
15	Safe		31.7
15 lots	Office supplies (paper punchers; staplers; folders; pencil sharpeners, etc.)		2.9
1	Vehicle w/ spares		13.5
1	Gas stove		0.5
1	Freezer		0.9
1	Refrigerator		1.0
1 lot	Training and demonstration aids and materials)))		6.5
1 lot	Training school supplies (over 5 years))		_____
	Sub-total		459.1

^{1/} Off-shore non-U.S. origin procurement.

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$000)</u>
<u>O. Home Extension Unit (Grant)</u>			
3	Pickup w/ spares 1 ea in yr. 1, 3 and 4.		47.7
18	Hanging scales (12 yr. 1, 6 yr 4)		0.9
18	Machete scales (12 yr. 1, 6 yr 4)		2.7
18	Knapsack sprayers (12 yr 1, 6 yr 4)		3.9
18	Steel tape, chrome (12 yr. 1, 6 yr 4)		0.9
36	Hand tool sets (24 yr 1, 12 yr 4)		1.1
1	Teaching aid consisting of slide projectors, screen easel-blackboard, generator spares		<u>2.1</u>
	Sub-total		59.3
<u>P. Extension/Demonstration Equipment/Commodity (Grant)</u>			
12	Pickup spares (7 yr 1; 2 yr 2; 1 yr 3; 2 yr 4)		176.2
73	Motorcycles ^{1/} (37 yr 1; 12 yr 2; 12 yr 3; 12 yr 4)		177.0
144	Bicycles and spares (72 yr 1; 24 yr 2; 24 yr 3; 24 yr 4)		14.8
39	Hanging scales (27 yr 1; 12 yr 3)		1.9
39	Machete scales (27 yr 1; 12 yr 3)		5.2
39	Knapsack sprayers (27 yr 1; 12 yr 3)		8.1
39	Steel tape (27 yr 1; 12 yr 3)		1.9
76	Hand tool sets (40 yr 1; 36 yr 3)		2.3
	25-ton fertilizer - DAP, urea and potash (5 ton/yr)		7.6
	Chemicals		3.6
	Teaching aids consisting of 1 ea. of projector movie, screen easel/black- board, projector slides, generator and spares		<u>5.6</u>
	Sub-total		404.2

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$000)</u>
Q. <u>Research Component (Grant)</u>			
7	Vehicles w/ spares (3 yr 1; 4 yr 3)		106.1
6	Motorcycles w/ spares (2 yr 2; 4 yr 3)		16.5
1	Field/laboratory research equipment (\$26.9 yr 1; \$5.1 yr 2; \$5.6 yr 3; \$6.1 yr 4 and \$6.6 yr 5)		50.2
	Production equipment (over 5 years) (\$17.9 yr 1; \$5.1 yr 2; \$5.6 yr 3; \$6.1 yr 4; \$6.6 yr 5)		41.3
	Supplies and materials (over 5 years) \$4.5 yr 1; \$5.1 yr 2; \$5.6 yr 3; \$6.1 yr 4; \$6.6 yr 5)		27.9
	Irrigation equipment (yr 1)		<u>13.4</u>
	Sub-total		255.4
R. <u>Small Farm/Entrepreneur Equipment (Loan)</u>			
	Small farm equipment/appropriate technology equipment, low hp tractors, animal-powered equipment and work animals, rural shops tools/equipment; agriculture/rural production, storage and marketing processing tools and equipment, small fishermen equipment and gear, raw materials for the local production thereof, and such other small farmers and agricultural input and support enterprise tools and equipment as AID may specify in Implementation Letters (\$1,802,500 yr 1; \$2,178,100 yr 2; \$3,413,900 yr 3 and \$1,218,000 yr 4)		<u>8612.5</u>
	Sub-total		8612.5
S. <u>Marketing Service Center (Grant)</u>			
2	Vehicles (yr 2)		30.1
2	Motorcycles (yr 3)		5.4
	Mechanical shop tools/equipment		<u>8.9</u>
	Sub-total		44.4

<u>Quantity</u>	<u>Description</u>	<u>Model</u>	<u>Price CIF(\$00)</u>
<u>T. Fertilizer Distribution (Grant)</u>			
2	Vehicles		<u>27.0</u>
	Sub-total		27.0
<u>U. MIDAS Project Executive Committee (Grant)</u>			
9	Trans-receiver radios		48.2
2	Typewriters, electric		1.6
3	Calculators		2.1
2	Duplicating machines		1.8
1 lot	Office equipment/supplies		3.1
4	Air conditioners		3.1
1	60' x 100 modular warehouse		165.3
10	Vehicles w/ spares (5 ea in years 1 and 2)		<u>151.7</u>
	Sub-total		376.9
<u>V. MIDAS Administrative/Management - USAID (Grant)</u>			
6	Vehicles w/ spares (1 yr 1; 5 yr 2)		88.0
1 lot	Spare parts (2 yr)		<u>9.4</u>
	Sub-total		97.4
	Estimated Total ^{1/} Item A through V ^{1/}		15791.2
	Estimated AAPC Fee ^{2/}		687.3
	Estimated Contingency ^{3/}		<u>828.1</u>
	Commodity Procurement Grand Total		17306.6

1/ Includes inflation estimated at approximately \$4,535.0

2/ Calculated as 6% of total estimated escalated base price for off-shore commodities.

3/ Calculated as 10% of total estimated base price before escalation.

Note 1

All of above prices includes 35% ocean freight and insurance and inflation but excludes contingency and AAPC fee. Contingency and AAPC fee are estimated and added as line items on Page 11.

Note 2

Schedule of procurement: according to time frame presented in main body of Project Paper, initial procurement to begin FY 81 unless otherwise indicated.

Note 3

Mr. Orris Shulstad, Consultant to MIDAS, K(a) Seed Project Unit recommends that items listed under H and I be procured from Code 899 sources; specifically, electrical equipment from Britain and raw materials for K(a) from West Germany. However, prior to approving this source procurement, it is recommended that a qualified engineering opinion is solicited to determine whether or not any of these commodities can be obtained from 000 source.

III. COMMODITY ELIGIBILITY

All commodities listed above are eligible for AID financing. USAID/G with AID/W approval, has standardized on GM vehicles for all project procurement to facilitate repair and spare parts availability. All necessary waiver requests and justifications are contained in Section VI of this procurement plan annex.

IV. SOURCE/ORIGIN

Except as indicated in Section II, equipment list, all commodities are Code 000 source. For commodities requiring waivers, the requests and justifications are contained in Section VI of this procurement plan.

V. SHELF-TERM PROCUREMENT

MIDAS II anticipates an approximate amount of \$500,000 local cost procurement of such items as spare parts, batteries, tires and tubes, construction materials, etc. Waiver requests and justifications for source/amount procurement are contained in Section VI of this procurement plan annex as most items are not available locally. Most shelf-items will be procured in Lome, Togo or Abidjan, Ivory Coast, Code 935 source, in addition to in the host country.

Note: Shelf-item procurement must be spelled out carefully in the implementation letter(s) so there will be no confusion on part of GOG what type of items are authorized to be procured.

VI. WAIVERS

Following requests for waivers:

1. Proprietary Procurement

All commodities listed in Section II.A, C, and J are for the Seed Multiplication component (Ghana Seed Company).

Approximate Value \$1,075,800 Source: Code 000

Justification: Proprietary procurement for the Seed Multiplication component equipment and farm machinery is necessary to achieve standardization and/or compatibility with like equipment previously purchased under MIDAS I. Purchase of different makes would preclude interchangeability of spare parts and would not be in the best interest of this project.

A substantial number of spare parts has been ordered for equipment that is now in country and being installed. The purchase of equipment from the same manufacturers would assure continued interchangeability, reduce the cost for and the amount of confusion about spare parts inventory, and result in easier repair, maintenance.

Additionally, the major manufacturer of the farm machinery already purchased, International Harvester, has local capacity to service the equipment.

2. Source/Origin for Procurement of Manual Typewriters Listed in Section II, Item E Seed Multiplication Equipment and Item N, Rural Credit Technical Equipment

Approximate Value \$32,600 Source: Brazil, Code 941

Justification: Brazil is the only country known to manufacture manual typewriters of the type required.

3. Origin and Proprietary Procurement Waiver for 100 Honda Motorcycles and Spare Parts from Japan, Code 899

Approximate Value \$243,900 Origin: Japan, Code 899

Justification: The MIDAS I Project has already procured 19 Honda, CB 1258 Motorcycles and spare parts. The MIDAS Project envisions use of motorcycles in the extension efforts to provide farmers in outlying areas with agricultural assistance. No motorcycles of the size and type required are currently manufactured in the U.S. Maintenance and repair facilities for Honda motorcycles exist in Ghana and, while current spare parts available are not numerous, these parts are more readily available than other makes. Makes and models of Code 941 were considered, but parts and repair facilities are non-existent in Ghana at this time.

The motorcycles requested are manufactured in Japan (Code 899) but will be purchased from a distributor in New York by AAPC. To permit greater interchangeability of spare parts and maintenance procedures, it is deemed in the best interest of USAID and GOG to permit this procurement.

4. Shelf-item procurement of approximately \$200,000 for local procurement of miscellaneous spare parts, office and training supplies and construction materials

Source: Ghana and neighboring countries

Code 935.

Justification: As the current local economic situation precludes availability of many shelf items normally indigenous to this area, to reach the stated objective of the project, it is necessary to make purchases in Lome, Togo or, at times, Abidjan, Ivory Coast.

It is recommended that in approving the project paper, unless there are objections to the contrary, waiver requests listed above be incorporated in the approval to facilitate speedier and more efficient procurement.

All detailed specifications have been drawn up for Section II, Equipment List for items A, C, D, E, H, I, K, L, and N. For those items still lacking specifications, the technical contractor for each sub-component of MIDAS II will have the responsibility of drawing up detailed specifications. All pesticides are on the AID Eligibility List.

SUMMARY OF VEHICLES PROCUREMENT

<u>Sub-Project</u>	<u>Type</u>	<u>No.</u>	<u>Total Cost</u>
Seed Multiplication	7-ton diesel trucks	6	\$194/7
	Crew Cab pickups - 3/4 ton	5	75.8
	10-ton truck w/ spare parts	2	74.1
	Suburbans	4	60.0
Ghana Seed Inspection Service	3 pickup trucks	3	43.3
	Motorcycles	4	8.8
Rural Credit	Blazers	19	285.4
	Motorcycles	15	36.5
	Armoured (bullion) truck	1	41.3
HomeExtension Unit	pickups	3	47.7
Extension Demonstration	pickups	12	176.2
	Motorcycles	73	177.0
	Bicycles	144	14.8

SUMMARY OF VEHICLES

<u>Sub-Project</u>	<u>Type</u>	<u>No.</u>	<u>Total Cost</u>
Research Component	Vehicles w/ spare parts	7	106.1
	Motorcycles	6	16.5
Marketing Service	Suburban	2	30.1
	Motorcycles	2	5.1
Fertilizer Distribution	Suburbans	2	27.0
MIDAS Project Executive Committee	Suburbans	10	151.7
USAID Adminis- tration	Suburbans	6	<u>97.4</u>
	Grand Total		1,669.5

A. Source and Origin of Goods and Service

Except as provided in paragraph "B" below and except as AID may otherwise agree in writing, goods and services procured by AID under the MIDAS II Project shall have their source and origin in the United States of America, Code 000.

B. Waivers

Based upon the justification set forth in the Project Paper and the Procurement Plan Annex, I hereby-:

1. Approve waivers for proprietary procurement of commodities listed in Section II, Items A, C and J for an approximate value of \$1,048,500.
2. Approve waiver of source origin code 941 for manual typewriters for approximately \$32,600
3. Approve waiver for origin and proprietary procurement for 100 Honda motorcycles and spare parts from Japan for approximately \$243,900.
4. Approve waiver for shelf-items to be procured in neighboring countries and the cooperating country (Code 935) in the approximate amount of \$200,000.
5. Certify that exclusion of above procurement would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program.

Date

Coler T. Butcher
Asst. Administrator for Africa

SUMMARY OF A.I.D. INPUTS - MIDAS II BY COMPONENTS
(Loan & Grant \$000s)

ANNEX VI-A
P. 1

Components	Year 1			Year 2			Year 3			Year 4			Year 5			Total All Years		Overall Total
	L	G	Total	L	G													
Seed	1236.9	1682.8	2919.7	607.3	893.5	1500.8	876.4	711.1	1587.5	1461.9	791.6	2253.5	1089.4	852.3	1941.7	5271.9	4931.4	10203.3
Credit	46.8	682.6	729.4	-	706.9	706.9	-	681.2	681.2	-	611.1	611.1	-	552.4	552.4	46.8	3234.2	3281.0
Extension	-	540.9	540.9	-	421.5	421.5	-	446.5	446.5	-	471.0	471.0	-	290.2	290.2	-	2170.1	2170.1
Research	-	259.3	259.3	-	530.5	530.5	-	503.9	503.9	-	727.0	727.0	-	640.6	640.6	-	2661.3	2661.3
Marketing	-	34.1	34.1	-	170.0	170.0	-	123.4	123.4	-	150.8	150.8	-	169.7	169.7	-	648.0	648.0
Fertilizer	-	203.9	203.9	-	237.4	237.4	-	40.35	40.35	-	41.3	41.3	-	3.2	3.2	-	526.15	526.15
Small Farm Pilot Project Equipment	2030.1	-	2030.1	2432.3	-	2432.3	3779.3	-	3779.3	1343.5	-	1343.5	-	-	-	9585.2	-	9585.2
MIDAS Executive Committee	-	539.3	539.3	-	355.1	355.1	-	343.9	343.9	-	218.9	218.9	-	488.1	488.1	-	1945.3	1945.3
TOTAL	3313.8	3942.9	7256.7	3039.6	3314.9	6354.5	4655.7	2850.4	7506.1	2805.4	3011.7	5817.1	1089.4	2996.5	4085.9	14903.9	16116.5	31020.4

FINANCIAL SUMMARY OF AID INPUTS FOR MIDAS II BY INPUT
CATEGORIES
(LOAN AND GRANT IN \$000s)

Category	Year 1		Year 2		Year 3		Year 4		Year 5		Total-all Years		Percent	
	L	G	L	G	L	G	L	G	L	G	L	G	Loan	Grant
1. Vehicles	26.5	558.34	-	232.2	-	107.2	-	72.9	-	-	26.5	970.64	0.2	6.0
2. Commodities and equipment	1767.1	438.4	1473.1	24.5	2001.8	18.8	1127.6	17.0	406.8	8.9	6776.4	507.6	45.5	3.1
3. Ocean freight & Insurance	627.7	348.7	515.6	88.0	709.6	44.1	394.7	30.6	142.4	2.8	2390.0	514.2	16.0	3.2
4. Technical Assistance (48my 1/)	-	1060.3	-	1355.7	-	1319.9	-	1234.2	-	1332.3	-	6302.4	-	39.1
5. Participant Training (58 my)	-	436.0	-	487.2	-	252.6	-	191.8	-	78.0	-	1445.6	-	9.0
6. Other Costs (Misc. (in-country costs))	-	75.45	-	68.8	-	76.45	-	68.25	-	75.8	-	365.75	-	2.3
Sub-total	2421.2	2917.19	1988.7	2256.4	2711.4	1819.1	1522.3	1614.75	549.2	1499.1	9192.9	10106.5	61.7	62.7
7. 10% Contingency	242.2	291.7	198.8	225.7	271.1	181.9	152.2	161.5	54.9	149.9	919.2	1010.7	6.2	6.3
8. Escalation	521.6	663.3	733.7	815.7	1493.0	839.0	1021.1	1227.6	442.8	1346.0	4212.2	4891.6	28.3	30.3
9. AAPC Fee	128.7	70.71	118.4	17.07	180.2	10.3	109.8	7.9	42.5	1.75	579.6	107.7	3.8	0.7
Grant Total	3313.8	3942.9	3039.6	3314.9	4655.7	2858.3	2805.4	3011.75	1089.4	2996.5	14903.9	16116.4	100.0	100.0

1/ Total Expatriate Technical Assistance includes 25% in-country costs. It includes for years 2-5 approximately 2.5% Guinean Technical Assistance from BIRD/USI and administrative costs of additional ADB staff engaged in monitoring and implementation respectively of the marketing component.

A.I.D. INPUT - MIDAS II (Loan & Grant \$000s)

ANNEX VI-C
P. 1

Component	Year 1			Year 2			Year 3			Year 4			Year 5			Total all Years		Over-all Total
	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G	
<u>1. Seed</u>																		
Vehicles w/ spares	-	260.5	260.5	-	34.6	34.6	-	-	-	-	-	-	-	-	-	-	295.1	295.1
Comm. & equip.	664.4	256.2	920.6	290.7		290.7	381.8	-	381.8	587.6	-	587.6	406.8	-	406.8	2331.3	256.2	2587.5
Tech. Asst.	-	375.0	375.0	-	375.0	375.0	-	375.0	375.0	-	375.0	375.0	-	375.0	375.0	-	1875.0	1875.0
Participant training	-	157.8	157.8	-	155.0	155.0	-	23.4	23.4	-	23.4	23.4	-	23.4	23.4	-	383.0	383.0
Other Costs	-	12.5	12.5	-	13.5	13.5	-	11.0	11.0	-	10.0	10.0	-	11.5	11.5	-	58.5	58.5
Ocean freight & insurance	232.4	180.8	413.2	101.7	12.1	113.8	133.6	-	133.6	205.7	-	205.7	142.4	-	142.4	815.8	192.9	1008.7
Sub-total	896.8	1242.8	2139.6	392.4	590.2	982.6	515.4	409.4	924.8	793.3	408.4	1201.7	549.2	409.9	959.1	3147.1	3060.7	6207.8
Allowance for escalation	202.2	278.8	481.0	151.9	244.2	396.1	275.1	260.8	535.9	532.1	342.4	874.5	442.8	401.4	844.2	1604.1	1527.6	3131.7
AAPC Fee	48.2	36.9	85.1	23.8	-	23.8	34.4	-	34.4	57.2	-	57.2	42.5	-	42.5	206.1	36.9	243.0
10% Contingency	89.7	124.3	212.1	39.2	59.1	98.3	51.5	40.9	92.4	79.3	40.8	120.1	54.9	41.0	95.9	314.6	306.2	620.8
Grand Total	1236.9	1682.8	2919.7	607.3	893.5	1500.8	876.4	711.1	1587.5	1461.9	791.6	2253.5	1089.4	852.3	1941.7	5271.9	4931.4	10203.3

Footnotes:

- 1) AAPC Fee is 6% Escalated Base Price for offshore commodities.
- 2) 10% Contingency is calculated on total base price before escalation
- 3) Loan funded commodities for the Seed Component include Agricultural Chemicals, and imported veg etable seeds as follows: 32% year 1; 83% year 2; 74% year 3; 54% year 4 and 88% year 5 for a total of \$3260.51 thousand over the five years.

A.I.D. INPUTS - MIDAS II
(loan & Grant \$000s)

ANNEX VI-C
P. 2

Component	Year 1			Year 2			Year 3			Year 4			Year 5			Total All			Overall
	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G	To Total	L	G	Total	
2. Small Farm Credit																			
Vehicles w/spares	26.5	77.5	104.0		50.2			28.7			28.7			-		26.5	185.1	211.6	
Commodities & Equip.	-	21.0	21.0		16.4			7.1			7.1			0.8		-	52.4	52.4	
Technical Asst.	-	293.6	293.6		293.6			293.6			250.0			250.0		-	1380.8	1380.8	
Part. Training	-	70.4	70.4		78.0			96.2			62.4			54.6		-	361.6	361.6	
Other Costs	-	5.0	5.0		4.0			6.0			7.5			3.5		-	26.0	26.0	
Ocean Freight & Insurance	9.3	34.5	43.8		23.4			12.5			12.5			0.3		9.3	83.2	92.5	
Subtotal	35.8	502.0	537.8		465.6			444.1			368.2			309.2		35.8	2089.1	2124.9	
Allowance for Escalation	5.6	123.0	128.6		189.6			189.8			202.9			211.4		5.6	916.7	922.3	
AAPC Fee	1.8	7.4	9.2		5.1			2.9			3.2			0.9		1.8	19.5	21.3	
10% Contingency	3.6	50.2	53.8		46.6			44.4			36.8			30.9		3.6	208.9	212.5	
Grand Total	46.8	682.6	729.4		706.9			681.2			611.1			552.4		46.8	3234.2	3281.0	

A.I.D. INPUTS - MIDAS II
(Loan & Grant \$000s)

Component	Year 1			Year 2			Year 3			Year 4			Year 5			Total All Years		Overall	
	L	G	to- tal	L	G	total	L	G	Total										
<u>3. Extension</u>																			
<u>A. Extension Service</u>																			
Vehicles W/spares		116.7			35.5			26.9			35.6			-			214.7		214.7
Commodities & Equip.		13.0			-			3.6						-			16.6		16.6
Technical Asst.		125.0			125.0			125.0			125.0			125.0			625.0		625.0
Participant Trg.		45.2			45.2			26.0			26.0			-			142.4		142.4
Other Costs		4.0			2.5			3.8			3.2			2.0			15.5		15.5
Ocean Freight & Ins.		45.4			12.4			10.7			12.5			-			81.0		81.0
Subtotal		349.3			220.6			196.0			202.3			127.0			1095.2		1095.2
Allowance for Exc.		70.3			86.5			109.3			139.6			119.3			525.0		525.0
AAPC Fee		8.7			2.6			2.5			3.1			-			16.9		16.9
10% Contingency		34.9			22.1			19.6			20.2			12.7			109.5		109.5
Total		463.2			331.8			327.4			365.2			259.0			1746.6		1746.6

A.I.D. INPUTS - MIDAS II
(Loan & Grant \$000s)

Component	Year 1			Year 2			Year 3			Year 4			Year 5			Total All Years		Overall Tot	
	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G		
B. Home Extension																			
Vehicles w/spares		8.6		-		8.6			8.6			8.6			-			25.8	25.8
Commodities & Equip.		5.1		-		-			1.8			1.8			-			6.9	6.9
Technical Asst.		-		-		-			-			-			-			-	-
Part. Training		34.8		54.0		54.0			34.8			34.8			-			177.6	177.6
Other Costs		6.2		7.3		8.1			0.0			0.0			9.8			40.4	40.4
Ocean Freight and Insurance		4.8		-		3.0			3.6			3.6			-			11.4	11.4
Subtotal		59.5		61.3		73.7			57.8			57.8			9.8			262.1	262.1
Allowance for Escalation		11.3		22.3		37.3			41.3			41.3			20.4			132.6	132.6
AAPC Fee		0.9		-		0.7			0.9			0.9			-			2.5	2.5
10% Contingency		6.0		6.1		7.4			5.8			5.8			1.0			26.3	26.3
Total		77.7		89.7		119.1			105.8			105.8			31.2			423.5	423.5
Grand Total		540.9		421.5		446.5			471.0			471.0			290.2			2170.1	2170.1

A.I.D. INPUTS - MIDAS II
(Loan & Grant \$000s)

ANNEX VI-C
P. 5

Components	Year 1			Year 2			Year 3			Year 4			Year 5			Total All Years		Overall all Total	
	L	G	Total	L	G														
4. Small Farms Research																		68.9	68.9
Vehicles w/spares		25.9			2.8			40.2			-			-				68.9	68.9
Commodities & equip.		37.8			8.1			8.1			8.1			8.1				70.2	70.2
Tech. Asst.		-			303.8			316.7			340.0			340.0				1300.5	1300.5
Partic. Trg.		104.4			107.2			20.8			20.8			-				253.2	253.2
Other Costs		7.5			10.0			8.3			9.1			5.5				40.4	40.4
Ocean freight		22.3			3.0			16.9			2.0			2.5				46.7	46.7
Sub-total		197.9			434.9			411.0			380.0			356.1				1779.9	1779.9
Allowances for Escalation		37.1			50.0			47.9			308.2			248.0				692.0	692.0
A MPC Fee		4.5			1.3			3.9			0.79			0.85				11.34	11.34
10% Contingency		19.8			43.5			41.1			38.0			35.6				178.0	178.0
Grand Total		259.3			530.5			503.9			727.0			640.6				2661.3	2661.3

AID INPUTS - MIDAS II
(Loan & Grant \$000s)

Component	Year 1			Year 2			Year 3			Year 4			Year 5			Total All Years		Overall Tot.
	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G	
5. Small Farm Marketing																		
Vehicles w/spares		-			17.3			2.8			-			-			20.1	20.1
Commodities & Services		5.4			-			-			-			-			5.4	5.4
Technical Assistance		-			57.0			57.0			57.0			57.0			228.0	228.0
Participant Training		15.6			15.6			-			-			-			31.2	31.2
Other Costs		3.0			5.3			6.0			7.0			8.0			29.3	29.3
Ocean Freight & Insurance		1.9			6.1			1.0			-			-			9.0	9.0
Subtotal		<u>25.9</u>			<u>101.3</u>			<u>66.8</u>			<u>64.0</u>			<u>65.0</u>			<u>323.0</u>	<u>323.0</u>
Allowance for Escalation		5.2			57.3			49.6			80.4			98.2			290.7	290.7
AAPC Fee		0.4			1.3			0.3			-			-			2.0	2.0
10% Contingency		2.6			10.1			6.7			6.4			6.5			32.3	32.3
Grand Total		<u>34.1</u>			<u>170.0</u>			<u>123.4</u>			<u>150.8</u>			<u>169.7</u>			<u>648.0</u>	<u>648.0</u>

AID INPUTS - MIDAS II
(Loan & Grants \$000s)

ANNEX VI-C
P. 7

Component	Year 1			Year 2			Year 3			Year 4			Year 5			Tot. All Years		Overall Tot.
	L	G	Tot.	L	G	Tot.	L	G	Tot.	L	G	Tot.	L	G	Tot.	L	G	
6. Fertilizer																		
Vehicles w/spares		17.3			-			-			-			-			17.3	17.3
Commodities & Equipment		-			-			-			-			-			-	-
Technical Assistance		125.0			125.0			-			-			-			250.0	250.0
Participant Training		-			24.4			24.4			24.4			-			73.2	73.2
Other Costs		2.25			3.7			1.25			0.7			1.0			8.9	8.9
Ocean Freight & Insurance		6.1			-			-			-			-			6.1	6.1
Subtotal		150.65			153.1			25.65			25.1			1.0			355.5	355.5
Allowance for Escalation		36.95			69.0			12.1			13.7			2.1			133.9	133.9
AAPC Fee		1.2			-			-			-			-			1.2	1.2
10% Contingency		15.1			15.3			2.6			2.5			0.1			35.6	35.6
Grand Total		203.9			237.4			40.35			41.3			3.2			526.2	526.2

AID INPUTS - MIDAS II
(Loan & Grant \$000)

Component	Year 1			Year 2			Year 3			Year 4			Year 5			Total All Years		Overall Total
	L	G	Tot	L	G													
7. <u>Small Farm/Pilot Programs</u> <u>Equipment</u>																		
Small tractors, commodities and equipment	1102.7			1182.4			1620.0			540.0						4445.1		4445.1
Ocean Freight and Insurance	386.0			413.9			576.0			189.0						1564.9		1564.9
Sub-Total	1488.7			1596.3			2196.0			729.0						6010.0		6010.0
Allowance for Escalation	313.8			581.8			1217.9			489.0						2602.5		2602.5
AAPC Fee	78.7			94.6			145.8			52.6						371.7		371.7
10% Contingency	148.9			159.6			219.6			72.9						601.0		601.0
Grand Total	2030.1			2432.3			3779.3			1343.5						9585.2		9585.2

AID INPUTS - MIDAS II

(Loan & Grant \$000s)

ANNEX VI-C

P. 9

Component	Year 1			Year 2			Year 3			Year 4			Year 5			Total All Years		Overall Tot
	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G	Total	L	G	
8. MIDAS EXECUTIVE COMMITTEE ADMINISTRATION																		
Vehicle w/spares		51.84			91.8			-			-			-			143.64	143.64
Commodities & Equipment		99.9			-			-			-			-			99.9	99.9
Technical Assistance		141.7			76.3			152.6			87.2			185.3			643.1	643.1
Participant Training		7.8			7.8			7.8			-			-			23.4	23.4
Other Costs		35.0			22.5			32.0			21.75			35.5			146.75	146.75
Ocean Freight and Insurance		52.9			31.0			-			-			-			83.9	83.9
Sub-Total		389.14			229.4			192.4			108.95			220.8			1140.69	1140.69
Allowance for Escalation		100.55			96.0			132.2			99.1			245.2			673.05	673.05
AAPC Fee		10.71			6.77			-			-			-			17.48	17.48
10% Contingency		38.9			22.9			19.26			10.9			22.0			114.09	114.09
Grand Total		539.3			355.1			343.9			218.9			488.1			1945.3	1945.3

GOG CONTRIBUTION

MIDAS IIANNEX VI-D

P. 1

\$000 (Equivalent)

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Total</u>
I. Seed Multiplication:						
Counterpart salaries	121.7	133.9	147.3	162.0	178.2	743.1
Value physical facilities	87.2	88.8	3698.7	-	-	3874.7
Admin/operating costs	78.3	86.1	94.7	103.2	114.6	476.9
Other costs	24.2	28.3	31.2	34.3	37.7	155.7
Sub-total	311.4	337.1	3971.9	299.5	330.5	5250.4
II. Seed Inspection:						
Counterpart salaries <u>1/</u>	8.5	8.5	8.5	9.2	9.2	43.9
Value physical facilities	220.0	-	-	-	-	220.0
Admin/operating costs	4.0	4.0	4.0	4.6	4.6	21.2
Other costs	5.3	5.3	5.3	5.6	5.6	27.1
Sub-total	237.8	17.8	17.8	19.4	19.4	312.2
III. Small Farm Credit:						
<u>ADB Training Center</u>						
Counterpart salaries <u>1/</u>	2.6	2.8	3.0	3.3	3.5	15.2
Value physical facilities	0.4	0.4	0.4	0.4	0.5	2.1
Admin/operating costs	1.5	1.7	1.6	1.6	1.8	8.2
Other Costs	3.3	3.1	3.1	3.0	2.9	15.4
Sub-total	7.8	8.0	8.1	8.3	8.7	40.9
<u>Loan Operations</u>						
Counterpart salaries	413.7	540.9	1137.4	1774.3	2767.9	6639.2
Value physical facilities	-	-	-	-	-	--
Admin/Operating costs <u>2/</u>	83.9	114.0	155.2	180.3	191.2	724.6
Other costs	-	-	-	-	-	-
Sub-total	497.6	654.9	1292.6	1954.6	2959.1	7358.8

1/ Includes leased buildings, land value and cost of construction (Seed and Research components).2/ Includes lease fees for all FLOs and Branches.

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Total</u>
IV. Extension						
<u>Extension Service</u>						
Counterpart Salaries	107.8	111.4	150.4	186.6	226.9	783.1
Value physical facilities <u>1/</u>	20.9	23.4	26.0	28.4	30.9	129.6
Admin/operating costs	26.0	81.0	103.4	121.3	143.7	475.4
Other Costs	12.8	1.8	6.2	6.5	7.1	34.4
Sub-total	167.5	217.6	286.0	342.8	408.6	1422.5
<u>Home Extension</u>						
Counterpart salaries	3.9	9.0	16.4	23.7	30.9	83.9
Value physical facilities <u>1/</u>	4.5	5.2	6.7	11.2	13.3	40.9
Admin/operating costs	6.0	6.0	7.0	12.6	17.6	49.2
Other costs	1.0	1.0	1.0	1.0	1.0	5.0
Sub-total	15.4	21.2	31.1	48.5	62.8	179.0
V. Small Farms Research						
Counterpart salaries	46.8	52.9	53.9	63.3	77.3	294.2
Value physical facilities <u>1/</u>	262.1	266.5	158.8	36.8	44.1	768.3
Admin/operating costs	21.0	24.0	27.5	31.6	36.4	140.5
Other costs	-	-	-	-	-	-
Sub-total	329.9	343.4	240.2	131.7	157.8	1203.0
VI. Small Farms Marketing						
Counterpart salaries	3.0	3.1	3.3	3.5	3.5	16.4
Value physical facilities <u>1/</u>	1.0	1.2	1.3	1.5	1.5	6.5
Admin/operating costs	25.0	29.0	31.0	32.0	35.5	152.5
Other costs	-	-	-	-	-	-
Sub-total	29.0	33.3	35.6	37.0	40.5	175.4
VII. Fertilizer						
Counterpart salaries	15.5	18.6	22.3	26.8	32.1	115.3
Value physical facilities <u>1/</u>	2.7	3.4	3.9	4.6	5.5	20.1
Admin/operating costs	4.7	5.6	6.7	8.0	9.6	34.6
Other costs	-	-	-	-	-	-
Sub-total	22.9	27.6	32.9	39.4	47.2	170.0
VIII. MIDAS Executive Committee						
Counterpart salaries	7.8	9.4	11.2	13.5	15.5	57.4
Value physical buildings <u>1/</u>	1.0	1.1	1.3	1.4	1.7	6.5
Admin/operating costs	2.3	2.8	3.4	4.0	4.6	17.1
Other costs	1.4	1.6	1.8	2.0	2.3	9.1
Sub-total	12.5	14.9	17.7	20.9	24.1	90.1

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Total	1631.8	1675.8	5933.9	2902.1	4058.7	16207.3
Contingency 10%	163.2	167.6	593.4	290.2	405.9	1620.3
Inflation	738.3	1508.2	7476.7	4614.3	7670.9	22008.4
Grand Total	2533.3	3351.6	14004.0	7806.6	12135.5	39836.0
Cummulative Inflation Rate	48	90	126	159	189	

ANNEX
TOTAL MAN YEARS FOR PARTICIPANT TRAINING AND TECHNICAL ASSISTANCE

ANNEX VI-E
P. 1.

PARTICIPANT TRAINING

TECHNICAL ASSISTANCE

Component		Yr.					Total Man Months	Total Man Years	Component	Yr.					Total	
		1	2	3	4	5				1	2	3	4	5		
<u>SEED</u>		93	85	9	9	9	205	17.08	<u>SEED</u>	-	-	-	-	-	-	-
<u>CREDIT</u>		34	30	23	24	21	136	11.33	Long term	3	3	3	3	3	3	15
									Short term	-	-	-	-	-	-	-
<u>EXTENSION</u>		<u>40</u>	<u>52</u>	<u>40</u>	<u>28</u>	<u>-</u>	<u>160</u>	<u>13.33</u>	<u>CREDIT</u>	<u>2.33</u>	<u>2.33</u>	<u>2.33</u>	<u>2</u>	<u>2</u>	<u>10.99</u>	
At Extension Serv.		22	22	10	10	-	64	5.33	Long term	2	2	2	2	2	10	
									Short term	0.33	0.33	0.33			0.99	
B. Home Extension		18	30	30	18		96	8.0								
<u>RESEARCH</u>		54	62	8	8		132	11.0	<u>EXTENSION</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>5</u>	
									Long term	1	1	1	1	1	5	
									Short term	-	-	-	-	-	-	
<u>MARKETING</u>		6	6				12	1.0	<u>RESEARCH</u>		<u>2.27</u>	<u>2.27</u>	<u>2.69</u>	<u>2.69</u>	<u>9.92</u>	
FERTILIZER			14	14	14		42	3.5	Long term		2	2	2	2	8	
MIDAS COMMODITIES		3	3	3			9	0.75	Short term		0.27	0.27	0.69	0.69	1.92	
<u>TOTAL (MM)</u>		<u>230</u>	<u>252</u>	<u>101</u>	<u>83</u>	<u>30</u>	<u>696</u>		<u>MARKETING</u>		<u>0.16</u>	<u>0.16</u>	<u>0.16</u>	<u>0.16</u>	<u>0.64</u>	
<u>TOTAL (MY)</u>		<u>19.16</u>	<u>21.0</u>	<u>8.42</u>	<u>6.92</u>	<u>2.5</u>		<u>58.0</u>	Short term							
									<u>FERTILIZER</u>		<u>1</u>	<u>1</u>			<u>2</u>	
									Long term							
									<u>USAID ADMIN</u>		<u>1.08</u>	<u>0.58</u>	<u>1.17</u>	<u>0.67</u>	<u>1.42</u>	<u>4.92</u>
									Short term							
									<u>TOTAL</u>	<u>8.41</u>	<u>10.34</u>	<u>9.93</u>	<u>9.52</u>	<u>10.27</u>	<u>48.47</u>	

Total Cedis Working Capital Required to Service Credit Needs of
Planned B/A Region New and Existing Borrower Caseload

ANNEX VI-F
P. 1

TABLE I (NEW BORROWERS)

	<u>Year</u> <u>1</u>	<u>Year</u> <u>2</u>	<u>Year</u> <u>3</u>	<u>Year</u> <u>4</u>	<u>Year</u> <u>5</u>	<u>Total</u> <u>¢</u>	<u>¢2.72 to</u> <u>\$ U.S.</u>
A. PROGRAM							
1. Credit Facilities							
ADB Branch	5	6	8	8	8		
ADB FLO	3	5	7	7	7		
BOG Rural Bank	2	4	5	6	7		
Sub-total	10	15	20	21	22		
2. New Borrowers							
ADB Branch FLO	5,125	6,970	11,375	15,200	15,200	53,870	
BOG Rural Bank	750	2,100	3,675	5,550	7,725	19,800	
Sub-total	5,875	9,070	15,050	20,750	22,925 ^{1/}	73,670	
D. PROGRAM FUNDING							
1. Working Capital Requirement (¢)							
	(1600/Unit)	(2052/Unit)	(2292/Unit)	(2748/Unit)	(3352/Unit)		
ADB Cr. Facilities	8,200,000	14,302,440	26,071,500	41,769,600	50,950,400		
BOG Rural Banks	1,200,000	4,309,200	8,423,100	15,251,400	25,094,200		
Sub-total	9,400,000	18,611,640	34,494,600	57,021,000	76,044,600	196,371,840	72,195,529

^{1/} Represents projected actual new borrowers under MIDAS IIB

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Total</u>	<u>¢2.72 to \$U.S</u>
2. Source of Working Capital (¢)							
MIDAS I Funds to be used during MIDAS II <u>2/</u>	12,011,960	5,824,608	1,754,737	-	-	19,591,305	7,202,686
GOG funds required			2,282,051	31,421,014	39,426,010	73,129,135	<u>6/</u>
MIDAS II funds <u>3/</u>	6,500,560	7,986,900	12,043,720	5,801,570	2,607,580	34,940,330	
ADB Carryover contribution <u>4/</u>	-	4,512,000	9,589,704	19,798,358	34,811,010	68,711,670	
Carry over	-	9,112,520	8,824,388	-	-	(17,936,908)	
Total available	18,512,520	27,436,028	32,212,549	25,599,926	37,418,590	196,371,840	
Total required	9,400,000	18,611,640	34,494,600	57,021,000	76,844,600	196,371,840	

Table 2 (Existing Borrowers - Brong-Ahafo Region:

	<u>Year 79-80</u>	<u>Year 1:80-81</u>	<u>Year 2:81-82</u>	<u>Year 3:82-83</u>	<u>Year 5:83-84</u>	<u>Year 5:84-85</u>	<u>Total</u>
A. Program Funding							
Working Capital Requirements (¢)							
ADB Existing Farm Borrower Caseload	20,000	20,000	20,000	20,000	20,000	20,000	
ADB Contribution	(17,020,531)	7,148,623	16,211,026	21,709,600	27,940,800	34,812,000	107,822,049
GOG Contribution		<u>24,851,377</u>	<u>24,828,974</u>	<u>24,130,400</u>	<u>27,019,200</u>	<u>32,228,000</u>	<u>133,051,951</u>
Total Funds Required:	17,020,531	32,000,000	41,040,000	45,840,000	54,960,000	67,040,000	240,880,000

6/ a) No attempt was made to identify method of WC erosion replacement for RBs because of the RB organizational structure. It was again assumed that the WC erosion would be shared in some manner equitable to BOC and RB stockholders/borrowers.

b) GOG replenishment of WC erosion:

Year 1 ongoing to Year 2	¢ 3,948,000
Year 2 ongoing to Year 3	6,700,190
Year 3 ongoing to Year 4	11,383,218
Year 4 ongoing to Year 5	17,106,300
	<u>¢39,137,708</u>

2/ MIDAS I funds available for use under MIDAS II is calculated as follows:

(a) Cedi-generating loan funded commodities landed \$5,261,750 (¢14,311,960) less BOC first advance to ADB on May 1979 (¢2,300,000) = ¢12,011,960.

(b) Cedi - generating loan funded commodities on order \$2,141,400 (¢5,824,608)

(c) Undisbursed balance of cedi-generating loan funds = \$645,124 (¢1,754,737)

3/ MIDAS II loan funds required for importation of agriculture chemicals, imported vegetable seeds and small farm/pilot program equipment (see MIDAS II Procurement Plan).

4/ Preceding years funds available to ADB adjusted for proportion of delinquency and bad debts that get repaid and also for replenishment by GOG for capital erosion. The GOG replenishments are ¢3,948,000 year 2; ¢6,700,190 year 3; ¢11,383,218 year 4; and ¢17,106,300 year 5 for a total of ¢39,137,708.

5/ Excess of funds available carried over into years 2 and 3 of MIDAS II is calculated as follows: e.g., ¢12,011,960 + ¢6,500,560 minus ¢9,400,000 = ¢9,112,520, etc.

INITIAL ENVIRONMENTAL EXAMINATION

I. PURPOSE

Amended Regulation 16 of the Code of Federal Regulations, Part 216, Environmental Procedures (effective date June 28, 1976 as amended May 3, 1978), requires an Initial Environmental Examination of the reasonably foreseeable effects of a proposed action of an AID project on the human environment and provides guidelines for preparation of the IEE. The function of the IEE is to provide the basis for a Threshold Decision as to whether an Environmental Assessment or an Environmental Impact Statement will be required.

II. THE ENVIRONMENTAL SETTING

A. Geography and Climate

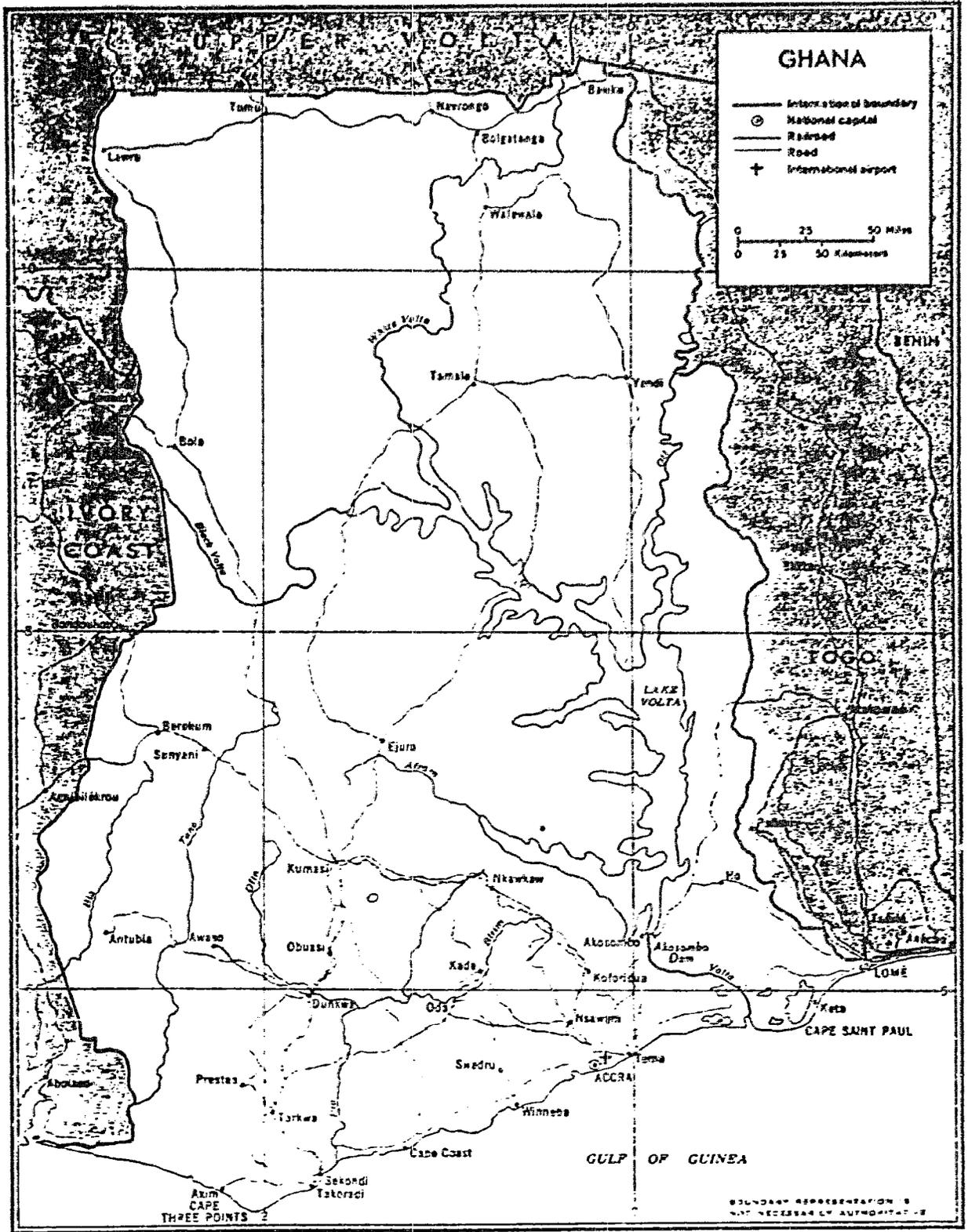
Ghana, situated on West Africa's Gulf of Guinea only a few degrees north of the Equator, is bounded by Upper Volta, Ivory Coast, and Togo (Figure 1). Half of the country lies less than 500 feet. The 334-mile coastline is mostly a low sandy shore backed by plains and scrub and interacted by several rivers and streams, most of which are navigable only by canoe. A tropical rain forest belt, broken by heavily forested hills and many streams and rivers, extends northward from the shore near the Ivory Coast frontier. This area, known as the Ashanti, produces most of Ghana's cocoa, minerals, and timber. North of this belt, the country varies from 300 to 1300 feet above sea level and is covered low bush, parklike savanna, and grassy plains.

The climate resembles that of other equatorial countries. The eastern coastal belt is warm and comparatively dry; the southwest corner is hot and humid; the forest belt, warm and humid; and the north, hot and dry. Except in the north, where the rainy seasons tend to merge, there are two rainy seasons separated by a short and fairly dry period in July and August and a longer dry season from December to February. A dry northeasterly wind, the Harmattan, blows in January and February.

The average distribution of rainfall during the year varies considerably over the country. Yearly totals range from 47 to 11 inches at Accra, from 130 to 47 inches at Axim, from 75 to 40 inches at Kumasi, and from 62 to 32 inches at Tamale.

1

Wills, J.B. (Ed.), 1962, Agriculture and Land Use in Ghana, Oxford Press was a primary source of information for section II.



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Figure 1. MAP OF GHANA

January is a dry month throughout the country, although the driest month in the eastern coastal districts is August. Very considerable variations exist between successive rainy seasons in time of onset, duration, and amounts received.

Temperatures are high, with little variation from year to year (2° to 3° F). Annual mean temperature (defined as the average of the mean maximum and minimum temperatures) shows only small variations across the country if these are adjusted for the effect of altitude (resulting in a decrease of about 3° F for each 1000 feet upwards). For places at near sea level, the lowest mean temperature (79° F) occurs on or near the coast, and the highest (84° F) between 8° and 10° N. The annual range of mean temperatures increases from 6° to 7° F in the south to 10 to 11° F in the north so that the temperature seasons are as well marked as the rainfall seasons.

Average maximum temperatures are highest in March over the entire country with the exception of an area between Akuse, Ho, and Tafo where temperatures are highest in February. The lowest average maximum temperatures occur in August over the entire country.

The problem of conservation and utilization of water resources is of major importance everywhere except in parts of the forest zone where there is little agricultural activity. Even in the forest zone, as many villages have discovered by experience, the rapid growth of agriculture sometimes is followed by an increased rate of run-off. Former permanent and trusted streams and springs fail to flow in the dry season and the water level falls in wells. The greater part of the country, including all of the northern and eastern districts and some coastal areas, suffers a chronic shortage of water, especially water suitable for drinking.

In Ghana, soil series rarely cover a sufficient area in individual expanses to make it practical to describe them on a country-wide basis. However, in the commonest type of soil association in the forest zone, a red, well drained soil and a brown, rather less well drained soil, both developed directly in the parent rock, occur in the summits and middle slopes of the topography; they are succeeded downslope by yellowish, seasonally poorly drained soils developed in colluvial material washed down from the upper slopes, and eventually by grey, poorly drained soils developed in valley-bottom alluvium derived from the same local rocks. Such a pattern normally repeats itself up-hill and down-dale so long as the underlying geology remains the same.

Soil erosion presently is not considered to be a major widescale problem in Ghana, but risks of its becoming more serious are considerable. Soil degradation (loss of fertility and tilth due to excessive or unwise cultivation), the step which precedes soil erosion, is evident in many parts of the country.

The natural vegetation of Ghana is determined largely by the climate with particular reference to the amount of rainfall and its distribution during the year. Generally speaking, topography has little effect on the vegetation.

The main forest area lies in the zone where the annual rainfall is between 50 and 120 inches. In this area, the rainfall reaches its maximum during two peak periods of May and June and September and October; the dry season is comparatively short but the humidity remains high throughout the year.

The areas outside the main forest zone, where the rainfall is generally less than 50 inches, are characterized by savanna woodland or grassland. Over much of these areas, rainfall reaches its maximum during August and September, after which it falls off rapidly and is followed by a long dry season of 4 or 5 months when humidity is low.

There are few areas remaining today where undisturbed natural virgin forest or savanna woodland exist. Humans have had considerable influence in shaping the present-day vegetation. In the forest zone, large areas have been cleared for agriculture or for industrial purposes, especially mining. In the savanna woodland and grassland areas, vegetation has been burned annually during the dry season for hunting or to encourage new growth of grasses for grazing.

Similarly, the kinds and numbers of native wildlife species have influenced considerably by human activities. Many species of previously known game animals, fishes, and birds have been affected significantly by agricultural practices, hunting, fishing, industrialization, lumbering, and river daming.

B. Ghana's Agriculture

1. Historical

Land rotation historically has been the principal agricultural system in Ghana. This is a system whereby cultivation is practiced for a few years and then the land allowed to rest, sometimes for a considerable period, before the scrub or grass which grows up is again cleared and the land re-cultivated. In such areas, however, the farms or settlements from which cultivation takes place are fixed and the cultivation of the land is the dominant occupation. The secondary growth which is allowed to appear has little or no economic importance.

There appears to be no formal rule as to how land is rotated, but recently cultivated land (potentially less productive land generally is avoided when plots are chosen for clearing and planting, and potentially more productive land (bearing natural vegetation of some years' growth), if available, is used in preference.

Shifting cultivation, whereby land is cleared and farmed for a few years and then abandoned, is practiced only in a few localities in Ghana and is often a short-lived precursor of agriculture by land rotation.

The majority of Ghanaian agriculture is controlled by small farmers who practice a form of subsistence agriculture. Whether commercialized or not, this subsistence agriculture is almost entirely uncatalized and only rarely are non-traditional methods or industrial techniques employed. The hoe and cutlass (machete) are universal implements of cultivation. Crops generally are intermixed and farmland for the most part is subject to considerable fragmentation. Except in the government constituted land planting areas, animal husbandry, when practiced, is not integrated with arable farming, even where animal droppings are used for manure.

2. The Trend Toward Modernization

Successes with the spectacular increases in rice yields in South and Southeast Asia, wheat yields in Latin America, and Maize yields in Latin America and East Africa in the past 15 years--developments commonly known as the "Green Revolution"--have given much hope to the underdeveloped world. Increased production of these cereal crops in a number of nations suggests that new production technology--high yielding crop varieties, fertilizers, pesticides, and various "package" combinations of these and other inputs--can be used to reverse a long struggle: that of not enough food supplies to cope with the world's expanding population. The basic lessons learned with cereal crops in Asia, Latin America, and East Africa are being extended to other crops and to other areas. Ghana, like many other nations, views this extension as a primary means for transforming the economic status of the country and the welfare of its rural population.

Institutions involved in the "modernization" of Ghanaian agriculture, are encouraging increased use of fertilizer, improved seed technology, new and improved crop varieties, and other inputs in the traditional agricultural system. In concert with the goal to increase productivity, the MIDAS project will encourage increased use of the basic inputs considered essential in raising productivity.

III. DESCRIPTION AND IMPACT OF ACTIONS ON THE ENVIRONMENT

A. Project Activities

As described elsewhere in the Project Paper (section 1 , p.1), the goal of the MIDAS project is "to increase the agricultural production, income, and welfare of the small farm families". To achieve this goal, the project will deliver production and marketing inputs and services with concentration in the Brong-Ahafo Region while continuing to strengthen and coordinate the necessary agricultural service institutions. The project consists of six basic components: credit expansion, fertilizer procurement and distribution, seed multiplication, small farm systems research, marketing, and demonstration and extension, including appropriate emphasis on the role of women. The objective of each of the components, administrative structure of the project, and other details are given elsewhere (section 3 , p.16). The primary target population of the MIDAS project is small farmers, individuals with small land holdings (generally 10 acres or less) currently employing essentially uncultivated, subsistence agricultural practices. The project will concentrate on increasing the agricultural production, income, and welfare of small farm families in the Brong-Ahafo Region. Annex.III A & B of the Project Paper provides useful information on the sociological profile and farming systems of the region.

B. Impact Identification and Evaluation

This section sets forth reasonably foreseeable impacts on the natural and human environment of the project's proposed major activities.

1. Fertilizer Procurement and Distribution

Some small farmers in Ghana are already using fertilizer. An activity of Phase I of the MIDAS project involved importation and distribution of fertilizer (primarily 15-15-15: 15 percent nitrogen, 15 percent phosphorus, and 15 percent potassium). Approximately 16,750 metric tons of fertilizer were imported under Phase I of the project. Its distribution to the various areas and agricultural sectors in Ghana has not been determined. But extension officials estimate that nearly half of all fertilizer disbursed in Ghana is for use on rice, primarily in relatively large farms of the Northern Region. Cotton is another primary use source. Fertilizer imported and distributed under Phase I of the project was probably consumed mostly by rice and cotton growers. Economic incentives are high for rice and cotton, and producers of these crops in the more productive areas of Ghana have been using fertilizer for several years.

Plans for importing and distributing fertilizer during the present phase of the MIDAS project are given in section (2) (p.13). Fertilizers to be imported and distributed are Muriate of Potash (commercial potassium chloride) and Diammonium Phosphate (known as DAP), and Urea.

Muriate of potash is a potash salt containing 48 to 62 percent of potash (K_2O), chiefly as chloride.

DAP, which chemically is $(NH_4)_2 HPO_4$ (DAP), is one of the two ammonium phosphates used widely as fertilizers. The pure salt contains 21.21 percent nitrogen and 53.76 percent phosphoric oxide. The fertilizer grade material contains from 18 to 21 percent nitrogen and from 46 to 54.25 percent P_2O_5 .

Urea, which chemically is $CO(NH_2)_2$, is a white crystalline, or granule, solid synthesized from ammonia and carbon dioxide. Urea has wide use in solid and liquid complex fertilizers and for direct application. For commercial use, the synthetic acid amide of carbonic acid contains not less than 42 percent nitrogen.

Use of one or more of these fertilizers will be encouraged; use in the Brong-Ahafo Region will be directed at primary food crops: maize, guinea corn (sorghum), garden egg (egg plant), cassava, groundnut (peanut), cowpea, and miscellaneous vegetables.

Potential Beneficial Impacts

There is very limited quantitative data on yield response and cost effectiveness of fertilizers when applied to mixed farming systems typical of the Brong-Ahafo; virtually all data originated from studies conducted under conditions of pure stands or mixed, but uniform stands not really representative of small farming systems in the Brong-Ahafo Region.

Nonetheless, it is assumed that use of fertilizer will result in increased crop yields. Fertility of the soil is low in much of the Brong-Ahafo Region; therefore, the crops generally should respond positively to the fertilizer use, but the resulting yield increase anticipated from use cannot be estimated.

Potential Negative Impacts

Improper use or prolonged heavy use of fertilizer in a given area may produce a negative impact. Some of the known negative interactions in the environment are as follows:

- On permeable soils having low organic matter content, excessive application of fertilizer nitrogen may send some nitrate into the drainage waters, especially under conditions of high rainfall. Heavy accumulation of nitrates in underground water has occurred in some areas. If excessive, the nitrates in the water may render it unsafe for human consumption; they may harm human health.
- Excessive amounts of fertilizers (which are salts) may injure growing plants under certain conditions.
- Fertilizers are known to interfere with some soil microbes. Use of ammonium-containing fertilizers, for example, will suppress bacteria. The long-term ecological effects of fertilizer applications in various environments are poorly known, however.

Nevertheless, because of the likely low intensity of fertilizer use in Ghana envisioned during the foreseeable future, no significant environmental impacts can be identified.

Required Action

Parallel with MIDAS project efforts to increase use of fertilizer in the Brong-Ahafo Region, project personnel will determine, under actual small farmer mixed cropping systems, the crop yield responses to fertilizers and the costs/benefits of the applications.

2. Seed Multiplication Component

Planned project activities of this component are described in Section (2) (p.9). The objective of the seed multiplication component is to expand and improve seed production and processing activities as to enable the distribution of high quality crop seeds to Ghanaian farmers. High quality maize seed will be increased on two government managed regional seed centers (one at Winneba and one at Kumasi--both are to be constructed and made operational during the MIDAS project) and on producer contract farms.

Potential Beneficial Impact

The activity promises to expand and improve maize seed technology in Ghana and, therefore, have a positive impact in raising crop yields and raising farm income. The seed technology experts cannot provide quantitative estimates of the potential benefits, however.

Potential Negative Impact

The following potential negative impacts are envisioned:

- As described in Section (2) (p.9), two regional seed center facilities will be constructed and made operational during the MIDAS project. One facility is being constructed at Winneba and another at Kumasi. Both will be located in rural environments with a relatively low population densities.

The construction projects will require the clearing of native vegetation, but only from sites where the physical structures are to be built (about square feet at the two sites). However, the action should result in significant environmental alteration only at the project sites. The structure will be constructed, electrically wired, and plumbed according to specifications of the government of Ghana.

The power-driven seed cleaning machines, through which all foundation and certified seed will be processed, will discharge some quantities of dust and small particles of plant material. However, standard (cyclone type) dust collectors will be installed in the machines as a measure to minimize discharge of atmospheric pollutants. Though some pesticides will be applied to maize produced on the regional seed centers and certified seed farms, only non-persistent materials will be used (refer to Section IV of the IEE). The atmospheric discharge of pesticide residues on the treated seed therefore

would be expected to be significant, especially in that the last pesticide treatment to the growing plants would precede the cleaning operation by several weeks.

- The regional seed centers and producer contract farms will use some pesticides, one of which (Phostoxin) is highly dangerous to humans. The conditions under which it is to be used, the potential human hazards associated with use, and steps required to mitigate the hazards (including conditions precedent to its use) are discussed in Section IV of the IEE.
- Introduction of a new or improved crop variety into a new area may produce undesirable and unpredictable consequences. For example, the introduction of new high yielding varieties of rice, developed by the International Rice Research Institute into various parts of South and Southeast Asia have given rise to increased problems with very serious plant diseases and insect pests.

The potential problems associated with the introduction of new varieties of maize into Ghana appear to be lessened by the selection of composite (or synthetic), open-pollinated varieties. These generally possess a broader germ plasm base (than high yielding hybrids, for example) and, therefore, greater genetic diversity which generally ensures greater protection against pest attack (by virtue of genetically-controlled pest-resistant characteristics).

No major negative environmental impacts can be identified with certainty. The greatest potential known hazard will entail the use of the pesticide Phostoxin on the regional seed centers and producer contract farms. But the conditions precedent to its use, as specified in Section IV of the IEE, should mitigate the potential hazards significantly.

3. Research Component

Potential Positive Impact

The small farm systems research component should be expected to significantly widen the knowledge base in the Brong-Ahafo Region leading to more effective design and analysis of rural development in the Region.

Potential Negative Impact

The research component will entail the experimental use of some pesticides. But as described in Section IV of the IEE, the potential problems associated with their use are minimal.

Various physical structures (refer Section 2 , p.12) will be erected on the research farm. This will entail the clearing of some native vegetation, but the effects should be negligible and confined to a very small area. The structure will be constructed, wired and plumbed according to specifications of the Government of Ghana.

4. Extension Component

Potential Positive Impact

The potential gains from this activity are tremendous and are considered essential in meeting the MIDAS project goal.

Potential Negative Impact

The extension component will entail the experimental use of some pesticides. But as described in Section IV of the IEE, the potential problems associated with their use are minimal.

The demonstration homes (described in Section 2 , p.12) should have no detrimental effect on the environment.

5. Pesticide Use

Of all project activities, use of requested pesticides presents the potentially greatest environmental risk of known consequences. The following section deals specifically in the use of pesticides.

IV. ENVIRONMENTAL EXAMINATION OF PROPOSED PESTICIDE USE

A. Pest Problems and Pest Control Practices

1. Present Situation

The term "pest", as used here, refers to any group of organisms, such as insects, bacteria, viruses, weeds, nematodes, snails, slugs, birds, rodents, or others, that adversely affects the production, preservation, or use of agricultural plants or agricultural plant products. As used here, "pesticide" is any chemical preparation used to kill, repel, or otherwise mitigate pest population. Chemical pesticides include insecticides (to control insect pests), fungicides (to control plant disease organisms), herbicides (to control weeds), rodenticides (to control rodents), and other chemical agents used against various categories of pests.

Annual losses caused by agricultural pests in Ghana are not known. Pest control experts estimate that, worldwide, annual losses caused collectively by pests to the agricultural crops in the field and the postharvest products amount to a third or more of the potential food production.¹ These losses include the combined actions of pests that damage the planted, unsprouted seeds and growing plants in the field and the harvested products in storage or transit.

Though quantitative data on pest losses in Ghana are lacking, pests generally are considered to be a major obstacle to agricultural production. In a recent study of the economics of small farm systems and socio-economic conditions in the Atebubu District, the farmers being interviewed considered pests to be the second most serious obstacle to farm production; only poor weather was considered to be more important (Table 1).

The small farmers of Ghana have no organized program of pest control. But through generations and generations of trial and error and keen observation the traditional farmers have evolved numerous non-chemical pest control techniques, some of which are known to be effective. Hand weeding, for example, is effective if the weeds are removed at the proper times. Other examples include the destruction of postharvest residues infested with disease organisms, selecting the time of planting so that susceptible stages of growth do not coincide with the seasonal infestation peaks of the pests, burning undesirable vegetation, hand removal of pests from the crop plants, storing the postharvest products in clean, properly constructed facilities, and a whole host of other non-chemical alternatives. However, the techniques generally are labor intensive, and their effective use requires an understanding of the seasonal occurrence of the pests and their habits and biology in order that they can be applied timely and properly. Inadequate labor and lack of this understanding seriously constrain the effective application of the traditional techniques.

1. The experts' estimates are based on personal opinion; their accuracy is therefore questionable.

TABLE 1: FACTORS WHICH SMALL FARMERS OF THE ATEBUBU DISTRICT
CONSIDER TO BE SERIOUS OBSTACLES TO FARM PRODUCTION

Problem	Frequency	Percent
Poor weather (lack of rain, too little rain late rains)	672	35.7
Pests (diseases, insects, rats, squirrels, etc.)	521	27.7
Shortage/high cost of labor	287	15.2
Lack of farm inputs (fertilizers, insecticides, machinery and equipment and credit)	267	14.2
Crop loss by theft, stray livestock, fire outbreaks, other disasters	43	2.3
Poor (infertile) soil	41	2.2
Too much sunshine	31	1.7
Lack of market infrastructure (storage, transportation, feeder roads)	18	1.0
Too much rain	3	.2
	<u>1</u>	
	1883	100.0

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Frequency includes multiple responses.

SOURCE: The Economics of Small Farm Systems and Socio-Economic Conditions in the Atebubu District. By E.T. Acquah, M.S. Joshua, F.S. Lesnett, J.M. Nani-Nutakor, M.A., Tamakloe, J.C. Tuthill, and W.K. Woyome. December 1979. The University of Science and Technology, Ghana and Virginia State University, USA. 245 p + appendices.

Naturally occurring genetic and biological factors probably are the most effective weapons currently working to mitigate the crop pest problems of the small farmers. The traditional varieties of crop plants, for example, often possess genetically controlled characteristics that resist disease and insect pests. Though of low yielding potential, this germ plasm usually is more resistant or tolerant to pest attack than the less genetically diverse, higher yielding plasm of modern varieties which have been selected for high yielding characteristics, often at the expense of the pest-resistant characteristics. The inherent pest-resistant characteristics of the traditional varieties do not ensure complete freedom from pest damage; but the varieties offer some security to the subsistence farmers and they generally are much more durable than the high yielding varieties which lack the pest-resistant characteristics.

A complex of naturally occurring biological control agents--insect, predators, parasites, and disease-causing agents that affect insect pests--offer another form of security to the farmer. Often escaping the eye of the casual observer, these "natural enemies" are especially important in preventing the buildup of numerous species of crop insect and mite pests.

In effort to increase crop yields and to stop pest losses, an undetermined but small percentage of Ghanaian farmers have used chemical pesticides. Most of the pesticides being used by farmers are the synthetic organic materials derived from petroleum. Heaviest use has been primarily on high value crops (e.g., wetland rice, cotton), small-scale vegetable operations, especially those involving garden egg (eggplant) and tomato, seed increase farms, and postharvest products in storage. Small farmers, such as those typical of the Brong-Ahafo Region, are thought to use very small quantities, and the use seems to be primarily on garden eggs to control insect pests and on stored grain and grain storage facilities to prevent losses from insect pests and rodents. Costs of the pesticides probably are the number one factor constraining greater use by small farmers. The current inavailability of pesticides in local markets is obviously another constraining factor.

In addition, the Plant Protection and Quarantine Unit of the Department of Agriculture of the Ministry of Agriculture administers several programs in which pesticides are used, for example: preventing the spread of dangerous pests from one area to another, controlling sporadic outbreaks of grasshoppers, treating postharvest products in storage, and demonstrating the use of pesticides on selected farms. Pesticides are also used on the state farms being managed by the Department of Agriculture.

B. Planned Use of Pesticides in Project

AID's policy guidelines on the use of pesticides¹ in AID projects will be followed in the MIDAS project. AID's policy is to de-emphasize the sole use of pesticides in pest management programs, to seek to reduce dependence on pesticides by encouraging the use of currently available supplementary methods (alternatives to pesticides), and to take the initiative to develop new alternatives. However, the use of some pesticides is considered important in achieving the MIDAS project's goal to increase the agricultural production, income, and welfare of small families. The use of the requested pesticides is anticipated at three levels:

1. Experimental: Very limited quantities of some pesticides will be used for research or limited field evaluation purposes by or under the supervision of project personnel. The objective of the treatments will be to determine the efficacy and cost-effectiveness of certain pesticides, primarily the insecticides carbaryl, diazinon, and malathion and the microbial insect-disease agent Bacillus thuringiensis--all which eventually may be integrated into pest management systems in the Brong-Ahafo Region. The pesticides will be tested on small field plots or experimental postharvest storage facilities on research farms in the Atebubu District and on small field plots or postharvest storage facilities on collaborating producers' farms.
2. Regional Seed Centers: It is envisioned that the bulk of the pesticides requested for the project will be applied to seed increase blocks of maize (corn) of the regional foundation seed centers at Win neba and Kumasi. Approximately 300 acres of maize will be grown on the foundation seed blocks of the two regional centers. The seed increase blocks are highly mechanized, and fertilizers are used. Project personnel believe that the use of pesticides is essential to produce good yields of high quality maize seed on the seed increase blocks. The following pesticides are requested for use on these blocks: the herbicides atrazine, glyphosate isopropylamine salt (Roundup), and alachlor; and the insecticides carbaryl, diazinon, malathion, and Bacillus thuringiensis.

Project personnel believe that precautions must be taken to protect the harvested seed in storage from damage by insect pests. The fumigant Phostorin is proposed for this use, the tablet formulation of which will be inserted inside the bags of the stored grain. The insecticides malathion and carbaryl also are proposed for use in protecting the harvested grain in storage. The materials will be applied to and around the stored bags of grain as required to reduce infestations of insect pests. An estimated maximum of 25,000, 200-pound bags of maize seed will be harvested from the foundation and certified seed blocks each year and all will be stored in storage facilities in the regional seed centers up to the time of distribution

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Policy of Pesticide Support, appearing in Handbook 1.

to farmers for planting. (Approximately 3200 acres of maize will be grown on seed increase blocks of producer certified seed contract farms managed by collaborating farmers).

All pesticides used on the regional seed centers will be purchased with project funds and will be applied under the supervision of project personnel. Project funds also will be used to purchase Phostoxin used on the seed contract farms under the supervision of project personnel).

3. Farmer Use: Pesticides purchased from project funds may be made available to a limited number of farmers who will apply the materials themselves in training and demonstration programs. Only pesticides known to pose minimal hazards to humans and the environment are proposed: the insecticides carbaryl, diazinon, and malathion, and the microbial insect disease agent Bacillus thuringiensis. They will be provided only to those farmers who have been instructed by project personnel on the proper use of the pesticides (including the potential hazards and precautions to minimize these hazards) and who have access to appropriate safety apparel and devices and facilities for proper disposal of used pesticide containers and left-over pesticides.

(If the need arises for additional uses of pesticides which cannot be identified at this time, procedures specified in paragraph 216.3(b) (1) (v) of Environmental Procedures, Regulation 16, will be followed).

C. Pesticide Procedures

Paragraph 216.3(b) (1) (i) of Environmental Procedures establishes the procedures used here for evaluating the risks and benefits of the planned pesticide use.

1. The USEPA Registration Status of the Requested Pesticides

Pesticides requested for use in the project are shown in Table 2. All of the pesticides are registered by the U.S. Environmental Protection Agency (USEPA) for the same or similar use proposed by the project and all are being used in the U.S.A. Products of crops treated with the pesticides or postharvest products treated with the pesticides will be used for human consumption only if appropriate tolerances have been established by the USEPA (or recommended by the Food and Agriculture Organization/World Health Organization) and when the rates and frequency of application, together with the prescribed preharvest intervals, do not result in residues exceeding such tolerances.

TABLE 2: PESTICIDES REQUESTED FOR USE IN MIDAS PROJECT

Common Name or (Trade Name)	Formulations to be used	Acute Oral 1 LD 50 (mg/kg)	RPAR Issued or 2 Restricted	Proposed Use 3	Growing Crops or Postharvest Products to be treated 4
<u>Insecticides</u> <u>Bacillus thuringiensis</u>	Stabilized suspension, wettable powder	Not established but considered harmless to humans, animals, and useful insects	No	E, FU	CA, CO, GC, GE, GN, M, MV, R, T, Y (Growing Crops)
Carbaryl	Dust, Wettable powder	850	Pre-RPAR	E, SF, FU	ditto (Growing crops, postharvest products)
Diazinon	Emulsifiable solution, wettable powder	300-400	No	E, SF, FU	ditto (Growing crops)
Malathion	Emulsifiable concentrate	1375	No	E, SF, FU	ditto (Growing crops, postharvest products)
(Phostoxin)	Tablet	Not established but restricted highly toxic to humans		SF	M (seed in bags)
<u>Herbicides</u> Alachlor	Emulsifiable concentrate, granule	1800	No	SF	M (Growing crops)
Atrazine	Wettable powder, flowable liquid	3080	No	SF	M (Growing crops)
<u>Glyphosphate</u> Isopropylamine salt	Salt	4300	No	SF	M (Growing crops)

1. Source: Farm Chemicals Handbook. 1979. Meister, Publ. Co. See Section IV.C.5 for explanation.
2. Refer Section IV.C.1 for explanation.
3. Experimental: SF = Seed Farms (Regional seed centers and producer seed contract farms);
FU = Farmer Use (use by farmers other than seed contract farmers) in demonstration programs.
4. CA = Cassava; CO = Cowpea; GC = Guinea Corn (Sorghum); GE = Garden Egg (eggplant); GN = Groundnut(peanut)
M = Maize (field corn); MV = Miscellaneous Vegetables; R = Rice; T = Tomato; Y = Yam.

Pre-RPAR Status and Required Action

One of the pesticides, carbaryl, is under pre-RPAR (RPAR - rebuttable presumption against reregistration) review on the basis that it may cause teratogenicity (abnormal formation of fetus) and fetotoxicity (toxicity to fetus) in experimental animals.

If USEPA issues a notice of rebuttable presumption against registration, an Environmental Assessment or Environmental Impact Statement may be required, as specified in paragraph 216.3(b)(1)(iii) of Environmental Procedures, if continued use of carbaryl still is requested.

Restricted Use Status and Required Action

One of the requested pesticides, Phostoxin, a fumigant, has been classified by USEPA for "restricted use" on the basis of its inhalation hazards to humans.

A pesticide classified for restricted use in the U.S.A. is limited to use by or under the direct supervision of a certified applicator. When an AID project includes assistance for the procurement or use, or both, of such a pesticide, the Initial Environmental Examination must include an evaluation of the human hazards associated with the proposed USEPA restricted uses to ensure that the implementation plan which is contained in the Project Paper incorporates provision for making the recipient government aware of these risks and providing, if necessary, such technical assistance as may be required to mitigate these risks. The human hazards are evaluated below in 5 of this section; also, the required actions of project personnel and the Government of Ghana to mitigate these risks are specified. A condition precedent to its use in the project is included.

Registered Without Restriction Status and Required Action

The other requested pesticides, listed in Table 2, are registered by USEPA without restriction for the same or similar uses proposed here.

2. The Basis for Selection of the Requested Pesticides

Quantitative data on efficacy of the requested pesticides are lacking in Ghana. Therefore, extension bulletins and other documents from other countries were a primary source of information. The pesticides have been effective in other countries when used for purposes similar to those proposed here. Personnel of the Ghana Ministry of Agriculture (Accra), the University of Ghana (Legon), and the West Africa Rice Development Association (Accra) assisted in identifying pesticides for use in the project.

Human health and environment were important considerations in selecting requested pesticides to be used experimentally, by farmers, or in the farmer demonstrations in the project. If used properly, these pesticides (carbaryl, diazinon, malathion, and Bacillus thuringiensis) should pose minimal risks to humans and the environment. Costs and availability also were important considerations. These pesticides are "relatively" inexpensive compared to alternative pesticides also considered reasonably safe for use by small farmers.

In the past, all of the requested pesticides except one (Bacillus thuringiensis) have been available in local markets in the project area and have been purchased by some of the small farmers. None is currently available locally, however. For project use, they must be purchased from U.S. firms. Ghanaian pest control specialists (with the Ministry of Agriculture and the universities) believe that the three pesticides should reappear in the local markets if the economic situation improves in Ghana. Prospects for marketing Bacillus thuringiensis also would be expected to be favorable. The product is being used in many developing countries.

A different set of criteria was employed in selecting pesticides for use on the regional seed centers. The herbicides (alachlor, atrazine, and glyphosate isopropylamine salt) requested for use on the centers have been used to some extent on larger farms in Ghana but they have not been used by small farmers because of their high costs. Their use on the seed centers is believed to be essential to ensure timely control of weeds which is more difficult with hand labor. Phostoxin, proposed for use at the seed centers and seed contract farms, is highly toxic; it should be used only by a trained applicator. As described below in 5 of this section, provisions must be effected in order to ensure its proper application on the seed centers and seed contract farms. Though some farmers in Ghana have used Phostoxin, use of the material by these individuals is considered to be unsafe.

3. The Extent to which the Proposed Pesticide Use is Part of an Integrated Pest Management Program

Reliance on a single pest control method such as a chemical pesticide does not always provide lasting protection. Experience has shown the desirability of spreading the burden of pest protection over a variety of methods--biological, physical, and chemical--integrated and used on the basis of anticipated economic, ecologic, and social consequences. The approach is known as "integrated pest management." Integrated pest management (IPM) is especially applicable on small farming operations characteristic of the Brong-Ahafo Region. Experience has shown that it is the most effective approach for managing pests on a continuing basis at the lowest costs to the farmers.

Highly desirable components of many IPM systems include the use of crop plants that genetically resist or tolerate pest populations; the use of naturally-occurring biological organisms such as predators, disease agents, and parasites; and the use of cultural or habitat management practices such as crop rotation, destruction of postharvest crop residues, selection of planting time, and selection of appropriate crop mixes. Some of the most effective non-chemical IPM techniques are as old as traditional agricultural itself.

An objective of IPM is to identify and maximize the use of natural biological, environmental, and traditional control methods known to be effective. Pesticides and other artificial controls are used only when definitive data demonstrate their economic advantages over the non-chemical methods; their use is based on economic criteria to determine when and where control is truly justified. Further, pesticides that pose minimal risks to humans, other non-target organisms, and the environment are sought and encouraged.

There has been no major effort to develop IPM systems for any crop in Ghana. Economic criteria for pest control have not been established; the real value of natural enemies is not known; there has been no effort to seek ecologically selective pesticides; and there is no organized systematic pest monitoring or surveillance system for any crop. Therefore, the pesticides proposed for use in MIDAS I will not be used in IPM systems to any extent at least in the early stages of the project.

The project affords an opportunity, through activities in both research and training, to increase the indigenous capacity in IPM in Ghana.

Required Action

The project will sponsor an advanced training program for one extension officer employed by the Ministry of Agriculture in Brong-Ahafo Region. This person will undergo an extensive one-year training program geared to allow maximum exposure to the principles of integrated pest management with emphasis on the use of traditional, non-chemical control techniques. Six months of the training program should be field oriented; training either at the International Institute of Tropical Agriculture in Ibadan, Nigeria or the International Rice Research Institute in Los Baros, Philippines is recommended. Both international centers have excellent programs in integrated pest management in small-scale, mixed cropping systems. The other six months of the training program should be conducted at a leading U.S. university where classroom instruction in principles of IPM are emphasized in a context of developing country needs. The UC/AID Pest Management and Related Environmental Protection Project, headquartered at the University of California, Berkeley, has major responsibilities for AID training programs in IPM and pesticide management in developing countries and can assist in directing the training program.

Upon completion of the one-year training program, the Ministry of Agriculture Employee will be appointed as extension coordinator for pesticides and pest management for the Brong-Ahafo Region. The individual will be responsible for coordinating training programs for extension agents and farmers in the region, with emphasis on the use of traditional, non-chemical pest control techniques known to be effective and supplemented when needed with cost-effective pesticides. Farmer demonstrations conducted under field conditions on the farmers' fields will be an important aspect of training.

The project should also sponsor applied research to test out under farmers' field conditions the effectiveness of traditional, non-chemical pest control techniques with promise in the Brong-Ahafo Region. Schemes for optimizing use of the traditional methods by themselves or in combination with minimum inputs of pesticides and other artificial controls should be determined, both for preharvest and postharvest conditions. Appropriate cost/benefit analyses should be made so as to determine when and where control by pesticide is truly justified.

4. The Proposed Method or Methods of Application, Including Availability of Appropriate Application and Safety Equipment.

(a) Experimental: Applications of the insecticides shown in Table 2 identified as "E" under the next to last column will be made by project personnel to small experimental field plots and to the postharvest products and/or storage facilities. Simple, inexpensive application techniques that the small farmers can understand, access, and use without difficulty will be sought and demonstrated as part of the experimental program.

(b) Regional Seed Centers: Harbicides used for this purpose (refer Table 2, next to last column item "SF") will be sprayed to the soil before or after planting; a tractor-mounted spray machine will be used to dispense the sprays. Project personnel will administer the spray applications.

The non-restricted insecticides carbaryl, diazinon, malathion, Bacillus thuringiensis) used on the regional seed centers will be dispensed by back-pack sprayers, manual dusters, or granule applicators, depending on the formulations of pesticides and target pests involved.

For applications of the requested insecticide fumigant Phostoxin, used to control insect pests inside of the bags of stored seed, formulated tablets (one 3-gram tablet per bag) will be dropped into open bags of grain which then will be sealed. The chemical properties of Phostoxin, the potential human hazards associated with its use, and steps which will be enforced to mitigate such hazards are described below in topic 5.

(c) Farmer Use: Limited quantities of the insecticides carbaryl, diazinon, and malathion and the insect disease agent Bacillus thuringiensis will be applied by small farmers in the Brong-Ahafo Region participating in the farmer demonstration and training program. The objective will be to demonstrate the concept and proper use of the materials. Farmers participating in the program will be instructed by project personnel on the proper use of the insecticides (including the potential hazards and precautions to minimize these hazards).

(d) Safety Precautions: The project will provide and enforce the use of all appropriate protective devices and apparel (face masks, gloves, boots and clothes) as required to mitigate hazards with the requested pesticides. Project personnel will be responsible for enforcing the safety procedures specified on the pesticide products' labels including procedures concerning the time of re-entry into fields after pesticide application and the number of days between application and crop harvest.

Used pesticide containers will be punctured or crushed so as to prevent use as water or food containers; the used containers and any left-over pesticides will be buried in an area designated specifically for this purpose.

The use of Phostoxin on the regional seed centers and producer seed contract farms requires special safety precautions, as described below in topic 5.

5. Any Acute and Long-Term Toxicological Hazards, Either Human or Environmental, Associated with the Proposed Use and Measures Available to Minimize Such Hazards

All pesticides are potentially hazardous to humans and the environment and should be treated with great caution regardless of their relative toxicity.

Of the pesticides requested for use in the MIDAS project, all but one (Phostoxin) can be purchased and applied by farmers, home-owners, gardeners, and others without restriction, according to U.S. Environmental Protection Agency regulations. All but Phostoxin are relatively acutely non-toxic to warm-blooded animals, as evident by the acute oral toxicity values (LD50) shown in Table 2. A LD50 value is a statistical estimate of the dosage (milligrams of active toxicant per kilogram of body weight) necessary to kill 50 percent of a treated population of white rats or other test animals. LD50 values are useful in comparing the relative toxicity of different chemical compounds; however, they have certain limitations, and caution must be used in interpreting them in relation to actual use hazards. Nevertheless, when compared to pesticides considered to be highly toxic to humans (for example, azinphosmethyl, acute oral LD50 = 13-16.4 mg/kg; or parathion, acute oral LD50 = 13 mg/kg) all of the requested pesticides but one (Phostoxin, for which an LD50 is not available, is highly toxic to humans) generally are considered to be relatively safe for use by humans if used according to instruction on their manufacturers' labels. Bacillus thuringiensis has no known harmful effect on human health.

None of the requested pesticides is known to persist for long periods in the environment; they are biogradable or are broken down by weathering or sunlight.

As noted above (1), the U.S. Environmental Protection Agency has placed carbaryl on the pre-RPAR list on the basis of evidence that it may cause teratogenicity or fetotoxicity. Project personnel will keep abreast of any subsequent USEPA ruling on carbaryl. Issuance of a RPAR may necessitate preparation of an Environmental Assessment or an Environmental Input Statement of continuation of carbaryl still were requested.

Carbaryl is highly toxic to honey bees and other pollinators and should not be used near beehives or where bees are actively foraging. Also, its use may cause the destruction of beneficial insects important in regulating the density of insect pests. Further, its use near aquatic ecosystems may cause harm to fish.

Diazinon also may be dangerous to bees and various other beneficial insects. High dosages may cause harm to fish, various wild birds and animals, and livestock and game. Further, the high dosages may cause phytotoxicity (plant injury) to the treated crops.

Malathion also may harm bees, various other beneficial insects, and fish.

Insofar as known, the microbial agent Bacillus thuringiensis is harmless to humans, animals, other beneficial species, and the environment. The bacterium occurs naturally. The commercial product is exempt from requirements for tolerance on all raw agricultural commodities when applied to growing crops, for both preharvest and postharvest uses.

If used according to instructions on the products' labels, the requested herbicides should not have a significant negative impact on the environment. If used improperly, they may harm the crops to which applied. Also, they may affect the natural flora or other crops in the target area. The products' labels provide instructions for mitigating these effects and must be enforced by project officials.

A potential serious problem associated with use of insecticides is the development of genetically resistant strains that can no longer be controlled by previously effective insecticides. Repeated use of the same insecticide over a period of several years may result in the selection of the resistant strains. The development of resistance has been encountered in some of the world's most serious agricultural and stored product insect pests, some species of which occur in the Brong-Ahafo Region. Resistance currently is probably not a serious problem in the Brong-Ahafo Region because pesticides have not been used that extensively. The potential exists, however, and steps should be taken to guard against it.

All of the potential hazards discussed above can be minimized by adopting appropriate safety procedures and by applying the pesticides selectively and judiciously based on actual need.

Special Problems with Phostoxin and Required Action

The chemical composition of Phostoxin is aluminium phosphide formulated with ammonium carbonate and hard pharmaceutical paraffin. The pesticide as requested is formulated as a tablet (3 grams); 30 tablets are packed in a tube with 3 or 16 tubes per purchased unit. When dispensed from the tube moisture in the atmosphere activates the fumigant action; moisture releases hydrogen phosphide (PH), a gas known as phosphine. The gas is effective against insects. The gas is effective against insects.

Phosphine gas is highly dangerous to humans; inhalation may result in death or very serious harm. The potential hazard is greatest to the applicator who inserts the tablets into the bags of seed. The dangerous gas is highly volatile. Toxic residues disappear from the fumigated seeds quickly, generally in a few days.

Use of Phostoxin should only be undertaken by trained personnel. In the USA, the material is limited to use by or under the direction supervision of a certified applicator who has been required to demonstrate proficiency in the safe handling of dangerous pesticides.

It is estimated that 25,000 bags of maize seed entering distribution channels may be produced annually on the regional seed centers and producer contract farms (this assumes that the seed multiplication component will achieve its targeted output during the project). All bags of seed will require fumigation with Phostoxin. There are no effective alternative that pose less hazard than the Phostoxin fumigant; the alternatives are generally much more hazardous, because their use requires bulk fumigation procedures. (Surface sprays (e.g., malathion) are not considered effective.

As a condition precedent to the use of Phostoxin in the project, the Ministry of Agriculture shall designate one or more persons, trained according to AID specifications, responsible for ensuring safe use of Phostoxin; use of the pesticides in the project will be limited at all times to use by or under the direct supervision of those designated persons. If AID specifications require additional training for such persons, project funds may be allocated for such purposes. Project funds also may be allocated as required to purchase safety devices and to enforce the use of all precautionary measures deemed necessary to ensure safe use of Phostoxin in the project.

6. The Effectiveness of the Requested Pesticides for the Proposed Use

As discussed above under 2 there are no quantitative data on the efficiency of the requested pesticides in the project area. The requested pesticides were selected because of their known effectiveness in other countries where the pests and cropping situations are similar to those in the project area. The requested pesticides will be applied according to instructions on their manufacturers' labels. Therefore, it is assumed that their uses will provide adequate control of the pests unless genetically resistant strains exist in the population. No toxicological studies have been conducted in Ghana to determine the degree of genetic resistance of the pests to the requested pesticides. But because of the past history of low pesticide use in the country, resistance probably is not a major problem at present.

7. Compatibility of the Proposed Pesticides with Target and Non-Target Ecosystems

See discussion of 5 above.

8. The Conditions Under Which the Pesticides are to be Used Including Climate, Flora, Fauna, Geography, Hydrology, and Soils

See discussion of II above, and also IV.A and B.

9. The Availability and Effectiveness of other Pesticides and Non-Chemical Control Methods

Presently, there is a severe shortage of pesticides (and many other imported products) in Ghana, and they are not readily available for purchase or for distribution through the public institutions.

This situation is not likely to change so long as the existing economic problems continue. Lack of foreign exchange currency presents the importation of foreign products. Pesticides used in Ghana in the past have been imported from other countries.

Due to lack of quantitative data on pesticide efficacy in the project area or similar areas in Ghana, it is not possible to compare the effectiveness of the requested pesticides with alternative pesticides.

Further, it is not possible to compare the effectiveness of the requested pesticides with alternative methods (biological control, traditional cultural practices, and use of genetically resistant strain of crop plants, for example). However, many of the alternative methods generally are recognized as effective; integrated together in integrated systems of pest management, as discussed above under 3, the alternative methods probably provide the greatest assurance for long-term pest protection. But as discussed in that section, there has been no effort to develop integrated pest management systems for the project area.

10. The Requesting Country's Ability to Regulate or Control the Distribution, Storage, Use and Disposal of the Requested Pesticides

The Ministry of Agriculture of Ghana grants licenses to commercial firms engaged in the sale of pesticides but has limited control of the types of pesticides sold in the country. The MOA currently has no effective enforcement mechanism for ensuring the regulation or control of the distribution, storage, use, or disposal of pesticides in Ghana.

11. The Provision Made for Training of Users and Applicators

The public institutions presently have no programs structured specifically to train users or applicators, although the use of pesticides is routinely addressed in various extension programs carried out by the MOA.

The condition precedent to use of Phostoxin, outlined in 5 above, and the training program specified in 3 above are deemed essential to ensure appropriate training of users and applicators in the project.

12. The Provisions Made for Monitoring the Use and Effectiveness of the Pesticides

Ghana currently does not have the capacity to effectively monitor the use and effectiveness of the requested pesticides.

Required Action

Project personnel will maintain accurate records on the kinds and amounts of pesticides being used on primary crops in the project area. A baseline survey will be conducted at the beginning of the project; the survey should be repeated every year of the project to reflect changes in crop acreage and any changes in pesticide use patterns.

Project personnel also will obtain efficacy data on pesticides used in the project, including data on the costs/benefits of the pesticides and known chemical and non-chemical alternatives.

13. Summary

Selective use of pesticides, at the lowest minimum effective dosages, based on actual need and integrated with other techniques (e.g., pest resistant varieties of crops, crop rotations, various non-chemical traditional methods), is the surest way to avoid serious ecological disruptions and human health hazards. However, even then, it is inevitable that use of some of the pesticides will result in destruction of various beneficial species within the target area, especially natural enemies and pollinators that inhabit the treated crop; use of insecticides may temporarily unleash some non-target pest species from natural control, causing them to increase in abundance. The ecological disruptions would not be expected to be long lasting nor would they be expected to occur over large areas. The disruptions would be expected to occur largely in the treated fields; the primary affected beneficial species (insect predators), (other natural enemies, and pollinators) would be expected to recover, once the pesticide treatments were discontinued. Generally, unless applied repeatedly and intensively over a large area, the affected beneficial species rebound quickly following the discontinued use of non-persistent pesticides such as those requested. The prophylactic or "package" use of pesticides, on the other hand often leads to very serious ecological disruptions and the emergence of genetically resistant strains of pests.

V. SUMMARY AND CONCLUSION

Most impacts of project activities have been identified as a significant long-term beneficial impacts. The project promises to increase and sustain the production and earnings of the target small farmers. The potential benefits should outweigh the potential negative impacts on the human environment which have been identified. However, the required actions specified in the IEE, especially those concerning the use of pesticides, are considered essential to mitigate the potential negative impacts.

RECOMMENDED THRESHOLD DECISION: Negative;
Environmental Assessment or Environmental Impact Statement not required.