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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: [A] (A = ADD, C = CHANGE, D = DELETE)

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8. ESTIMATED FY OF PROJECT COMPLETION: FY 86

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 80; B. QUARTER 3 (Enter 1, 2, 3, or 4); C. FINAL FY 85

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 -)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL	500	-	500	10,137	1,034	11,171
(GRANT)	(500)	(-)	(500)	(10,137)	(1,034)	(11,171)
(LOAN)	(-)	(-)	(-)	(-)	(-)	(-)
OTHER U.S. 1. 649-0101	0	0	0	900	-	900
OTHER U.S. 2. 649-0104	0	0	0	3,685	-	3,685
HOST COUNTRY		800	800		5,610	5,610
OTHER DONOR(S)	1,200	300	1,500	22,400	6,500	28,900
TOTALS	1,700	1,100	2,800	37,122	13,444	50,266

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 80 F. GRANT	E. 1ST FY 80 G. LOAN	H. 2ND FY 81 I. GRANT	H. 2ND FY 81 J. LOAN	K. 3RD FY 82 L. GRANT	K. 3RD FY 82 M. LOAN
(1) FN	214-B	210	-	500	-	5244		1380	
(2)									
(3)									
(4)									
TOTALS									

A. APPROPRIATION	N. 4TH FY 83 O. GRANT	N. 4TH FY 83 P. LOAN	O. 5TH FY 84 R. GRANT	O. 5TH FY 84 S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN	12. IN-DEPTH EVALUATION SCHEDULED MM YY
(1) FN	2538	-	1529	-	11,171	-	07 83
(2)							
(3)							
(4)							
TOTALS							

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

[1] 1 = NO, 2 = YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Charles P. Campbell

TITLE: Charles P. Campbell
Mission Director, USAID/Somalia

DATE SIGNED: MM 04 DD 26 YY 80

15. DATE DOCUMENT RECEIVED IN AID W, OR FOR AID W DOCUMENTS, DATE OF DISTRIBUTION: MM 04 DD 30 YY 80

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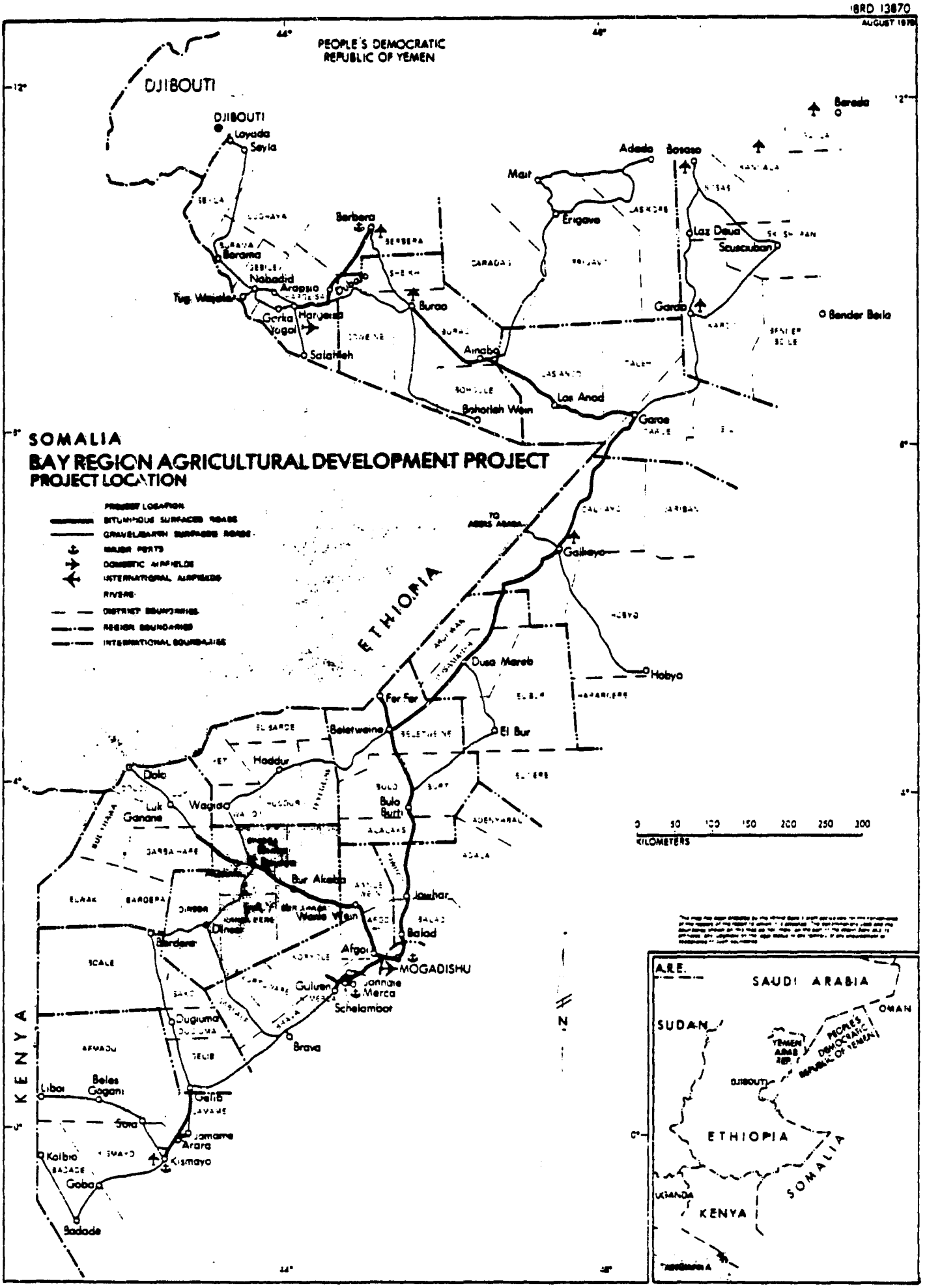

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Project Development Team

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Agronomy, Livestock, Econ	Utah State Team	
Extension Experience	USDA PASA Team	

ABBREVIATIONS

ADC	- Agricultural Development Corporation
ADF	- African Development Fund
BRDP	- Bay Region Development Project
FACO	- Multi-purpose Cooperative (Farmer's Agricultural Coop Organization)
FAO	- Food and Agriculture Organization, Rome
FMETC	- Farm Management Extension Training Center
FEA	- Field Extension Agent
IBRD/IDA	- World Bank-International Bank for Reconstruction and Development/ International Development Association
ILO	- International Labor Organization, Addis Ababa
LDA	- Livestock Development Agency
LDC	- Less Developed Countries
MLFR	- Ministry of Livestock,Forestry and Range
MMWR	- Ministry of Mineral and Water Resources
MOA	- Ministry of Agriculture
MOE	- Ministry of Education
MOH	- Ministry of Health
MPW	- Ministry of Public Works
NARI	- National Agricultural Research Institute
NES	- National Extension Service
NMEF	- National Monitoring and Evaluation Facility
NRA	- National Range Agency
NSA	- National Security Agency
ONAT	- National Tractor Hiring Agency
PADU	- Pilot Agricultural Development Unit
PMU	- Project Management Unit
REO	- Regional Extension Office
SASA	- Somali Academy of Science and Arts
SDR	- Somali Democratic Republic
SIDAM	- Somali Institute for Development, Administration and Management
SWDO	- Somali Women's Democratic Organization
SNU	- Somali National University
TDY	- Temporary Duty
WDA	- Water Development Agency
USAID	- United States Agency for International Development
USCM	- Union of Somali Cooperative Movements
USDA	- United States Department of Agriculture

Somali Terms

"Gu"	- April through June (Heavy Rains)
"Der"	- October through December (Light Rains)
"Uar"	- Surface Water Reservoir

PROJECT DESCRIPTION

Background: Somalia, one of the 28 least-developed countries designated by the UN, is located on the Eastern Horn of Africa. A population of some 3.5 million reside in its 647,000 square kilometers. Over 80% of the population is directly involved in agriculture with some 40% being cultivators.

The economy of the country relies heavily on the primary sector, particularly agriculture and livestock. The mainstays of its exports have traditionally been livestock (84%), and bananas (10%). The country has been in a food deficit position for many years with food imports amounting to over 20% of total imports.

Agriculturally, the potential for both expansion and intensification is great. At present, less than 1% of the potentially cultivable land is under cultivation. Yields are very low and technologies utilized are primitive. Over the past 10 years the small farmer segment has taken a back seat to capital intensive, semi-industrialized agriculture undertaken on State farms. The government has now recognized this inbalance and is planning to devote greater resources to the small farmer segment.

The private sector in agriculture is dominated by small subsistence farms which, in aggregate, account for 80% of the cereals and oilseed production of the country. Typically, the private small farmers are producing for subsistence with a small marketable surplus to provide for purchased necessities.

The AID strategy in the sector, as defined in the CDSS, is to address the needs of the sector in a multi-donor framework to provide sufficient capitalization to assist the government in implementing their shift of emphasis back to the private, small farmer segment of the economy and to allow Somalia to achieve its goal of self-sufficiency in food production. The multi-donor program addresses the constraints of the sector on two levels, institutional strengthening and direct production.

The Agricultural Delivery Systems Project (649-0112) provides the primary institutional support required to revitalize the extension program. Under this project, a central extension training program will be installed at the Farm Management Extension Training Center (FMETC). This will be the source of properly trained, practically oriented extension service staff. The project also provides for

strengthening of the National Extension Service (NES) headquarters using the Land Grant College/State Extension Service model of linkage between FMETC and NES for utilization of technical specialists. The development of an Agricultural Research Strategy and initiation of a well directed research program is also incorporated into project 0112.

Production interventions over the past 10 years have been heavily biased toward capital intensive irrigation work. However, water availability has become an increasingly severe constraint with costly off stream reservoirs being required for continued expansion. This coupled with the inherent inequity of such capital intensive works has provoked a new interest in vertical and horizontal expansion of the rainfed subsector.

Potential for development of rainfed production is geographically defined by the climatological characteristics of the country. Large expanses of the country lie outside the 450 mm isohet which makes rainfed production impractical. The southern one-third of the country and the northwest regions are the areas which have rainfed potential. The IBRD has an agricultural production project underway in the Northwest region. The areas along the Juba and Shebelli Rivers are primarily devoted to irrigated production and are already heavily utilized. In the remaining inter-riverine area the Bay Region enjoys the best rainfall and good soils as well as large expanses of presently uncultivated land which would be available for horizontal expansion.

Project Description

The Bay Region Development program has three objectives:

1. Increase crop and livestock production in the region by increasing production on currently cultivated land and expanding cultivation into new lands;

2. Integrate extension operations to incorporate both crop and livestock interventions in a farm systems approach; and

3. Establish a basis for decentralized integrated development planning and implementation through the PMU.

The Bay Region Development Project addresses the production program by utilizing a dual approach, intensification with short term payoffs, and horizontal expansion with longer-term payoffs.

The intensification program focuses on increasing production of existing farms both by increasing yields and by small increases in hectarage. It utilizes existing technical packages which have been

proven on a limited number of farms extended by a rejuvenated extension service. Minimum level technology aimed at moisture conservation, plant population, even plant distribution, decreased pest losses, etc., would be utilized to increase sorghum yields from 375 kg/ha to 425 hg/ha on 39,000 hectares by year 6 of the project. Adaptive research would continue to support this effort so that after 15 years the yields of sorghum utilizing the minimum technology package would reach 500 kg/ha and over 150,000 ha are cultivated using the improved methods. Animal traction activities will be encouraged allowing a small increase in farm size and augmenting the production increase. By year 8, research will have developed a minimum purchased input program for incorporation into the sorghum intensification program and by year 15 this could be giving a yield of 675 kg/ha on 34,000 hectares.

Table 1 below summarizes the production targets of the intensification program.

TABLE I - Targets

Year	Ha.	Incremental Production MT	Families
5	30,000	1,525	6,000
10	75,000	11,125	15,000
15	145,000	32,675	29,000
20	230,000	58,200	46,000

The program for horizontal expansion of production is much longer term and more costly but clearly needed. There is, unquestionably, a great deal (estimated at 350,000 hectares) of potentially productive land which is presently not utilized. The grazing lands over much of the country are presently exceeding or near their grazing capacity and therefore future population growth among present herder families must be accommodated in other economic pursuits, first of which is agriculture. Over the past year we have seen over one million refugees from the Ogaden region come into Somalia. It is not yet clear how many of these may be able to return to their former means of livelihood but at least some proportion will have to be absorbed into the economic fabric of Somalia. Horizontal expansion into the potentially productive land would permit an agricultural livelihood for some 300-400,000 people with some 50,000 associated on-farming people in the service and commercial sectors. This land would produce a minimum of an additional 25,000 MT of sorghum.

The horizontal expansion program requires land use planning as well as the provision of a significant amount of basic infrastructure, roads and water resources, to open the new areas for development. This planning and infrastructural development is incorporated into the Bay Region Project.

The farm systems approach with integrated crop and livestock extension is essential since most agriculturalists are both cultivators and herders. At the present time, the Ministries of Livestock and Agriculture each pursue their own chosen programs with minimal coordination. The project will utilize the authorities of the Project Management Unit to coordinate between the ministries. It will also incorporate the integrated approach into its training and research programs to cross train agents in crops and livestock and to provide farm system technology for the extension program.

Finally the project will establish an institutional structure which permits decentralized integrated development on a regional basis. This approach permits the introduction of a farming systems approach through the extension program utilizing agronomic veterinary, animal husbandry and rangelands interventions. It also permits a coordinated development effort encompassing infrastructure and economic development linked together to achieve mutual goals by supporting a good land use plan. The Project Management Unit as a fledgling regional development authority serves as the coordinative body for this integrated approach. Thus, effective long term development requires integrated multi sectoral planning and coordination which cannot be accomplished at the central level. The Bay Region Project is Somalia's long overdue first attempt at decentralized integrated development.

In order to achieve these long and short-term objectives, the project has numerous components.

1. Intensification of agriculture through the introduction of simple improved agricultural practices, the integration of livestock and agricultural production in a farm systems approach, strengthening the veterinary service, expanding seed production facilities, undertaking adaptive research on crop and livestock practices, and supporting the production and diffusion of farm tools and animal traction equipment.

2. Integration of services and planning through creation of a Project Management Unit which will coordinate between ministries to assure a unified development approach.

3. Improving the supply of potable water in the region for human and livestock consumption through (a) drilling and developing about 60 deep boreholes on the Limestone Plateau and the remainder, crop production areas; (b) an investigation/production drilling program in the Basement Complex involving about 40 drilled boreholes, 10 dug wells, and 4 uars; and (c) testing the availability of water for irrigation in the Limestone Depression by drilling about 6 boreholes and 2 test production wells.

4. Upgrading and maintaining all roads in the Bay Region to give all-season access to areas where agricultural production is presently or potentially significant, but (a) rehabilitating about 350 km of 6 m wide low standard main roads (class II), (b) constructing about 210 km of 4m wide feeder or access roads (class III), and (c) clearing about 250 km of access tracks. The Project would provide for road construction equipment, transport facilities, staff housing, a mechanical workshop, and incremental operating costs.

Detailed Description of Components

Agricultural Intensification. Intensification of the Farming System would be undertaken through two major efforts -- extension and adaptive research. The effectiveness of both is heavily dependent on the availability of the infrastructure to be provided in the road and water supply components of the Project. The physical inputs required by farmers to implement the recommended extension packages would be made available through the strengthened regional veterinary service and the seed farm subcomponent of the adaptive demonstrative research component. The PADUs (Pilot Agricultural Development Units) represent a structure for organization of controlled horizontal expansion. They would provide the means of identifying a practical way of organizing farmers/pastoralists and their local communities into entities capable of managing and policing their own resources. The range component appears as an integral part of the PADUs.

Land Use Capabilities Study. The land use capability study for the region will be undertaken early in the project. This study will be based on existing aerial photos and resulting maps with additional aerial surveying and ground truthing to define total cultivable lands, presently cultivated lands, soil types, drainage patterns, etc. By putting this information with the hydrogeological data collected in the water development component, a land use plan will be developed to guide the horizontal expansion. This land use capability survey is financed by IDA/IFAD.

The Regional Extension Service. The Bay Region would be the first major area to be strengthened as part of the National Extension Service (NES) provided for under the Agricultural Extension and Farm Management Training Project. The region would ultimately require about 106 Field Extension Agents (FEAs), each initially serving about 500 families. FEAs would be supervised by District Extension Officers (DEOs) who, in turn, would be supervised by the Regional Extension Officer (REO) who, assisted by Subject Matter Specialists (SMS), would head the regional extension program. It is expected that it would take 3-4 years before enough FEAs are deployed in the field to cover the four

Districts in the Region. The initial FEA messages would concentrate on the few important crops, a limited number of easily understood tasks and practices that could produce substantial increases in output using existing farmer resources without unduly adding to the risks inherent in the production environment. These would include husbandry practices such as field preparation, sowing and weeding and methods of improving the post-harvest utilization of food crops and crop residues. The introduction of more sophisticated technologies and inputs such as pesticides, new seed and crop varieties, and ox plows would follow as they are identified and developed by the strengthened Regional Research Service and can be appropriately packaged for extension.

As the NES would be at its early stage of development when the Bay Region Project is expected to start, the Project would provide for an additional internationally recruited extension specialist to work exclusively in the Bay Region to establish the links between the Projects at the operational level, participate in the formulation of regional research programs, and translate research findings into extension messages for the Bay Region.

AID is providing financing for the technical assistance training and commodities to support the extension effort and IDA/IFAD are financing civil construction and operating costs.

The Regional Veterinary Service. The regional veterinary service would be strengthened and made operational through the provision of technical assistance, training, transport facilities, equipment, and supplies to allow vaccination campaigns and programs for parasite control and disease diagnosis to cover the whole of the Bay Region. Specifically, the project would (i) staff and equip two mobile vaccination teams, each covering two Districts, (ii) train and equip resident veterinary staff in the Districts, (iii) establish and stock 13 new dispensaries and stock 17 existing dispensaries at the village level, (iv) strengthen the headquarters of the veterinary service at Baidoa and provide laboratory facilities, and (v) train Somali staff and provide technical assistance.

Because of lack of qualified veterinarians in Somalia, the Project would provide for an internationally recruited veterinarian who would be attached to the veterinary service headquarters at Baidoa and who would be responsible for establishing and coordinating work programs and supervising their implementation, both at headquarters and at the District level, and for training Somali staff on the job. In addition, the project would provide for transport facilities, staff housing, equipment, operating costs, training abroad two Somali veterinarians and short-term study trips. IDA/IFAD are providing financing for the operating costs of this component and AID the remainder.

Adaptive/Demonstrative Research. The regional service would be broadened and adapted to meet the immediate needs of farmers. This would be done by expanding the activities of the Bonka Research Station to include the present varietal testing and screening, and add applied research activities relating to: soil moisture conservation practices; the selection and improvement of farm tools and implements; the use of animal power for land preparation, row seeding and intra-row cultivation; the production of better quality seed; the integration of crop and animal production, both on-farm and rangelands; and the identification of appropriate crop and crop/pasture rotations that emphasize crops already known to farmers such as sorghum, pulses and groundnuts. The applied nature of this expanded program would be reinforced by: introducing field trials on selected farmers' fields using the Bonka Research Station staff to program and implement the work and actively motivate farmers to participate by providing certain goods and services free of charge and offering compensation at a previously agreed rate for any unforeseen losses resulting from their participation; establishing four Pilot Agricultural Development Units (PADUs) and including a range component, as an integral part of each PADU; and staffing and equipping the existing 200 ha seed farm near Bonka.

The four PADUs would be established to provide a workable answer to the question of how to organize farmers and pastoralists in the Bay Region in such a way that they would be motivated to preserve the productive potential of crop and rangelands. Existing family and village structure would be the starting point in identifying such an organizational set-up. The four PADUs would be located in areas that would reflect differences within the region as to soils, rainfall and relative importance of crops and livestock as a source of family income. Two would be located in the Limestone Plateau, one at Kansa Dere and one at Malmaud. Two others would be located in the Basement Complex, one at Bur Akaba and one at Dinsor. Each would have the potential to accommodate about 750 families with approximately 7,500 ha of cultivable land for crop production and on-farm animal husbandry, and around 55,000 ha of rangeland to support off-farm livestock. Both crop and rangelands would be supplied with potable water. Legal control of the water supply as well as the crop and rangelands would lie with the villages' traditional authorities, technically assisted by the extension service, the regional unit of WDA and the regional unit of NRA.

The 55,000 ha range component associated with each PADU are pilot in nature and would be supervised and implemented by the regional unit of the NRA to focus on both institutional and technical aspects of range utilization and improvement. Each would be demarcated and

subdivided for grazing in rotation and establishing a limited program of range research primarily geared to identifying procedures for rehabilitation, including alternative ways of bush clearing, the feasibility of reseeding using appropriate legumes and grasses and the possibility of improving existing charcoal production technology to make range improvement a more economically and financially attractive proposition.

In addition to regular adaptive/demonstrative trials, research in cropped areas of the PADUs would focus on testing practices with potential for preserving soil fertility, providing sufficient fodder to maintain on-farm livestock on a year-round basis, conserving moisture in the soil and increasing productivity. For this purpose, an integrated rotation of crops and sown pastures would be introduced by research staff on selected participating private farms and would be closely monitored by the Bonka Research Station staff over the project period in order to generate sufficient farm management data to serve as a basis for planning a more intensive agricultural development program for the Bay Region and to provide the extension service with proven practices to extend to crop and livestock producers.

The project would provide: technical services to the Bonka Research Station and the regional range service; the equipment necessary for range demarcation and uar rehabilitation; research equipment, transport facilities, staff housing, and operating costs; training abroad for two Somali Range Management Specialists for NRA, and two Agricultural Research Officers for the Bonka Research Station; and, short-term study trips. AID is financing all of this component except for operating costs financed by IDA/IFAD.

The Seed Farm. The existing 200 ha seed farm near Bonka would be staffed and equipped to bulk up already screened improved sorghum, groundnut, pulses, and some pasture seeds for general distribution to farmers. In an area where most people tend to be self-employed for at least part of the year, the farm would be equipped for mechanical production, cleaning, treatment and storage of seeds. Moreover, a workshop would be established on the seed farm to service both the seed farm's machinery, and that used on the Regional Research Station. This workshop would also serve as a center for developing prototypes of appropriate farm tools and implements that are identified by the Regional Research Station, and would cooperate with the staff of the Bonka Extension Training Center to train interested private blacksmiths in the manufacture and repair of these tools and implements.

Distribution of seeds is the responsibility of ADC. The seed farm would rely on the extension service to inform farmers of the merits of quality seeds and of their availability, and on ADC to

distribute seeds to farmers who would be willing to buy them. Because farmers are not used to purchasing inputs, a system would be established that would encourage them to exchange their own seeds for quality seeds.

The project would provide for an internationally recruited seed production specialist as the Farm Manager and for the periodic services of a consulting agricultural engineer, particularly to assist with the establishment of the proposed workshop and the development of a program for improving farm tools and implements. The project would also provide for farm machinery, implements and seed handling equipment, the establishment of the workshop, transport facilities, operating costs, training abroad of a Somali farm manager and a seed production specialist, and study trips for Somali staff.

USAID is providing the technical assistance training, equipment and supplies for this component with IBRD/IFAD providing civil works and operating costs.

Water Supply

During the first 3 year stage, the Project would be concerned with studies to obtain a better understanding of groundwater occurrence, and the effective use of uars, dug and drilled wells. Geological maps (1:100,000) would be compiled from existing air photos, satellite imagery and geological maps, supplemented by field checks. Particular attention would be paid to determining the size and form of the aquifer in the Limestone Depression, mapping the alluvial outcrops of the major wadi beds in the region, and compiling a full inventory of existing water points. Field work would be confined to drilling or digging wells and other preliminary investigation needed to identify the location and number of boreholes to be drilled on the Limestone Plateau (where the chance of success is "high"), and the preparation of a water development strategy for the Basement Complex and Limestone Depression (where the chance of success is "low"). These plans would then be implemented during the second 3-year stage of the Project investment period.

Work in the Basement Complex aims at preparing rational guidelines for improving the efficacy with which uars, dug and drilled wells can be located, designed and constructed to supply water for domestic and livestock use. The validity of the resultant guidelines and the criteria on which they are based would then be tested by constructing four pilot uars and ten dug wells and drilling up to 40 8-inch diameter boreholes to a maximum depth of 60 meters, monitoring the performance of the uars and testing the wells and successful boreholes for yield and water quality. Only half of the

40 boreholes are expected to be successful. At the end of the Project period, a manual would be issued to serve as a guide for further development of water supplies in this area.

The main item in the Limestone Plateau area is the construction of about 60 deep boreholes for domestic and livestock use, mainly in currently cropped areas. Six of these boreholes would be located in the range areas of the PADUs. The available evidence suggests that such drilling would result in successful boreholes. Information gathered during the first 3 year stage would result in a well based selection of sites. This coupled with sound design and good maintenance would minimize failures. Upgrading of the data base would be emphasized in the beginning of the drilling campaign. The first, say ten boreholes, would be spaced widely throughout the area to study variations in aquifer properties and groundwater quality. During the Project implementation period, all wells, completed and fully equipped, would be operated and maintained by the regional unit of WDA and would be carefully monitored. WDA would prepare an operation and maintenance manual on the basis of this monitoring.

The work in the limestone depression would be largely concerned with investigating groundwater availability, methods of exploiting this water and investigating the technical and economic feasibility of establishing and running two 5 ha pilot irrigated farms during the Project investment period. First, geophysical surveys (resistivity and magnetometer) would be carried out to study the geometry of the aquifer and determine the location of about six exploratory boreholes and two test production wells. The wells would be about 70 m. deep. They would be fully tested with step drawdown, constant discharge and recovery tests. Investigations would also be undertaken to identify ways of improving the use of water along the escarpment and the feasibility of introducing alternative lifting devices such as the "shaduf," animal drawn devices and possibly small centrifugal pumps. At the end of the Project Implementation period, a report on the technical feasibility and economics of irrigation would be issued, giving recommendations for the next stage of development.

AID will provide technical assistance, vehicles, equipment, and training of Somali staff under the Ground Water Project and supplies under the Bay Region Project. IBRD/IFAD are financing operating costs.

Access Roads

The Project would provide all-season access to all parts of the Bay Region where agricultural production is presently or potentially significant (Map 1). The improvement of the main roads would also have beneficial effects on regions to the north and west of the Bay

Region, which send their produce to Mogadishu through Baidoa. Currently, some of the existing main roads carry over 50 vehicles per day, many of which are large trucks and trailer units. A 6 m wide gravel road (class II) would be needed for the size and weight of vehicles presently using the roads and would provide a margin for traffic growth. A 4 m gravel standard road (class III) would be appropriate for the access/ feeder roads which would be carrying less than 50 vehicles per day.

Road construction costs are relatively low because the country is flat to moderately undulating and laterite gravel and limestone surfacing material is readily available in most districts. There are no major river crossings and, because of the seasonal rainfall, submersible paved fords would be adequate. Road construction and maintenance would be by force account supported by Technical Assistance staff. Since no tender documents are required for the construction of roads, the extra costs of detailed engineering would not be justified, given the standard of road envisaged. Due to the year-round agricultural activities in the area and the nomadic nature of part of the population, a labor-intensive approach to the construction of Project roads would not be feasible and the use of mechanical equipment provided for under the Project would be necessary for the timely and proper achievement of the aims of the Project as a whole. In order to service and maintain the equipment, a mechanical workshop would be constructed and equipped. Internationally recruited technical staff would also be provided to plan and execute the road component. Due to the changing and sometimes difficult soil conditions, the analysis and testing of sub-soils and the selection of fill and surfacing materials would play an important part in the design and quality control process. Provision is made, therefore, for a mobile soils laboratory to be used at Baidoa for simple analyses, leaving major analyses to be done at the solid laboratory in Mogadishu.

Road maintenance would start from the beginning of the Project period. New equipment would be used to make the existing main roads more passable until they are upgraded under the Project. By the end of the Project period, about 560 km of gravel roads would be under routine maintenance.

The ADF will provide equipment for road construction and maintenance, mechanical workshop equipment, transport facilities and incremental operating costs. IBRD/IFAD will finance technical assistance to the Regional Civil Engineering Department of MPW, and training for Somali staff. Implementation of the road program would be reviewed in conjunction with the review of progress in implementing other Project components at the end of the first 3 year stage and, where necessary adjusted in accordance with the work plans adopted for the water, research, veterinary and range components.

Project Management

A PMU would be established at Baidoa. It would implement the project on behalf of the Ministry of Agriculture and would work closely with the regional units of the Ministries involved in the project. The PMU would coordinate its activities with other development activities undertaken by the Regional Government and assurances were obtained at negotiations that all development activities in the Bay Region, which are not included in the project, shall be coordinated and consistent with the purpose of the project. In particular, it would be necessary that the PMU develop close working relations with the Governor and the District Commissioners. The PMU would consist of a Somali Project Director, an internationally recruited Project Technical Manager and a Financial Controller, their deputies and technical and administrative support staff. The PMU would be responsible for planning and coordinating Project activities, procuring of Project financed goods and services and for monitoring and evaluation of project activities. The PMU would require the services of a procurement agency to assist in drawing up specifications, preparing tender documents and analyzing bids for all project related procurement. It would also require the services of construction specialists to supervise the construction of buildings on its behalf.

A sound integral reporting system would be established by PMU to provide essential information for the successful management of the Project. Project staff in the field would keep diaries which would be inspected by their immediate supervisors. These diaries would reflect the progress in implementation of various project components, the problems encountered and possible suggestions for improvement. These diaries would be discussed at regular intervals with supervisors who would submit monthly written reports to the PMU based on discussions with the field staff.

IBRD/IFAD are fully financing this component.

Monitoring and Evaluation

All project components would be monitored by the PMU to provide management with an assessment of the progress made in achieving Project objectives. A monitoring and evaluation section would be established within PMU and would consist of two services, one for data collection and one for data processing. Data collection would be undertaken by a team of investigators who would primarily monitor physical progress in Project implementation. Such data would be handed over to the data processing service to be put into a form usable by Project Management for assessing whether schedules and targets set out in the program are being met, quantifying changes from the baseline over the program period and introducing changes in Project interventions, should this become necessary.

The ultimate test of the utility of the Project is the effect it would have on increasing crop and animal production and farmers' incomes. The Monitoring and Evaluation section would gradually build up a system for gathering information on the variables affecting farmers' incomes. Such variables include crop and animal husbandry practices and production input and output marketing channels available to farmers, yield levels, production constraints and indicators of performance of the institutions serving farmers. The Project Technical Manager would supervise the organization, collection and analysis of the data for his own and his staff's use and would establish a system for communicating results to various interested parties within the Project area, to concerned ministries, to donors, and to the NMEF in the State Planning Commission (to be established under this Project for independent monitoring and evaluation of development projects in Somalia).

USAID is providing financing for baseline studies and external evaluation, IBRD/IFAD are providing support for the NMEF.

The Financing Package

The following table shows the donor financing for various line items of the different components of the project.

Donor Contributions

Input Component	T.A.	Training	Civil Works	Equip-ment	Supplies	Operating Costs
Ag. Intensification	USAID (0101 & 0113)	USAID 0113	IBRD IFAD	USAID 0113	USAID	IBRD IFAD GOS
Water Supply	USAID (0104)	USAID (0104)	IBRD IFAD	USAID (0104)	USAID 0113	IBRD IFAD GOS
Access Roads	IBRD IFAD	IBRD IFAD	IBRD IFAD ADF	ADF	ADF	ADF GOS
Project Management	IBRD IFAD	IBRD IFAD	IBRD IFAD	IBRD IFAD	IBRD IFAD	IBRD IFAD GOS
Evaluation	USAID 0113 IBRD IFAD	IBRD IFAD	IBRD IFAD	IBRD IFAD	IBRD IFAD	IBRD IFAD GOS

AID Financed Inputs

AID is financing a majority of two components, agricultural intensification and water supply. The agricultural intensification component, which is a continuation of project 649-0101 activities, consists primarily of technical assistance as follows:

The extension specialist/agronomist will serve as the advisor to the regional extension advisor. He will assist the regional extension service to draw training and technical services from the National Extension Service (Project 649-0112), strengthen linkages between extension and the adaptive research activities at Bonka and help to create and manage the data collection activities of the extension service. He will serve as the officer principally in charge of the land use survey and planning exercise.

The Agricultural Research Officer will work at the research station at Bonka to organize a program of adaptive research. Emphasis will be on improvement of techniques introduced previously by the University of Wyoming team and more recently by the 0101 team. The introduction of improved practices and varieties developed in other regions of the world with similar climatic and soil conditions will be given high priority. An attempt will be made to develop a linkage with the AID-funded drylands project in Kenya and with international institutions. The development and training of local technicians, properly indoctrinated to emphasize applied rather than basic research will be strongly emphasized. Pest control programs through the use of biological and mechanical agents, as well as the introduction of disease and insect resistance varieties will be stressed, because of both environmental and cost effectiveness reasons. The majority of the work will be carried out with the major cereal grain of the region -- sorghum -- but the production of legumes for a vegetable protein source in the human diet and for crop rotation purposes will also be an important part of the production plan.

The Seed Farm Manager will have the responsibility of multiplying sorghum and legume seeds for distribution to the farmers of the region. The seed multiplication farm that has a potential of 200 ha of cultivable land is located 5 km from the Bonka Research Station. It is presently being operated on only a small portion of the available land with poor technology and management. The production of quality seed of improved sorghum varieties selected from local farmers fields will be of immediate and significant importance. This will bring about an intensification of the present activity. Although the agriculturalists of the area have developed a satisfactory grain storage system for their own consumption and commercialization, they do not have an adequate system to preserve the sorghum seed grain

from one season to another. The result is poor germination and reduced production because of uneven plant population. The seed farm would also be expected to multiply and have available for distribution, through the Extension Service, new sorghum varieties that might be discovered to be superior through the work done at the research station. The proximity of these two locations will favor the essential close working relations. The officer will take over the ongoing work of the MOA and expand it as demand and conditions indicate.

The veterinary officer will serve as the advisor to the regional veterinary officer. He will be responsible for organizing the vaccination program, the parasite control program and general veterinary program. He will develop and support linkages between the agricultural extension and the veterinary and animal production divisions to support the farming systems approach to extension.

The range management officer will serve as the advisor to the National Range Agency Officer in the region. He will assist the NRA officer to develop the grazing plan for the region and to implement range activities. He will develop close coordination between the NRA and the agricultural extension service and the veterinary and livestock production services to support the farm systems approach. Also he will coordinate closely with the water development program to assure most effective location of wells.

In addition to the technical assistance provided for the agricultural intensification program, AID will finance training, limited vehicle support, agricultural equipment and drugs and vaccines for this component. IBRD/IFAD and the GSDR will provide financing for the local operating costs of this component.

The water development component, which is a critical requirement for horizontal expansion, is financed under a combination of the Comprehensive Groundwater Project (649-0104) and the Bay Region Project (649-0113). The technical assistants, one driller, one mechanic, one electrician/mechanic, one geophysical technician stationed in Baidoa and a hydrogeologist, a civil engineer, a water use planner and assorted other skills to support the program stationed in Mogadishu will be provided under the Groundwater Project. Two drilling rigs will be provided to be stationed in Baidoa and additional rigs will be refurbished for use in Baidoa under the Groundwater Project.

The Bay Region project is provided with over $3 million to purchase the well casings, screens, pumps, etc., needed to make the wells effective and to provide the incentives to assure that IDA can perform.

AID also provides financing for short-term consultants to undertake baseline data collection and evaluation during the project.

ANALYSES

General

The analysis for this project was undertaken in several steps. Initially, an IBRD identification Mission reviewed the sector and determined that, in addition to the institutional support for the sector provided under the joint IDA/ADF/EEC/AID Agricultural Delivery Systems project, it was important to begin a decentralized integrated rural development program on a regional basis. A UNDP/FAO team under their joint coordination program, then reviewed past analysis including the 1963 AID Inter-riverine Study, the 1968 Lockwood study, and the Wyoming State experience and defined the minimum technology approach. At this point the initial AID project identification team reviewed the sector and recommended that AID participate as a co-financer in the Bay Region project.

In 1978 AID through REDSO/EA contributed an Agricultural Extension Specialist to work with the IBRD appraisal team to define the extension approach. IBRD analysts undertook agronomic, economic, engineering and institutional analysis at that time.

In 1979 AID financed a study team from Utah State to undertake on analysis for the design of our Agricultural Delivery Services Project 649-0112. At that time our complete Agricultural Sector Program including the Bay Region Project had been defined and the Utah State team was asked to focus on the Bay Region as a model in their analysis.

After approval of the PID for this Project, a team from Devres was fielded to undertake a review of existing analysis and to do the Social Analysis. In addition, the Mission called upon DSB/RAD under their contract with University of California at Berkeley for the managing of decentralization to do a complete institutional analysis. The Mission supplemented these analyses with analyses by our own Agricultural Office and Project Office.

The results of all these pieces of analysis have been summarized in the following section and the most pertinent analyses have been attached as annexes VII to XIV.

Programmatic

1. This Project represents the outreach segment of the USAID Agricultural Sector Program. It represents the final step to the grass roots of the Agricultural Delivery Systems Project (649-0112).

Where the ADS Project provides for initial training of potential agents and development of effective control, technical support and supervision mechanism, the Bay Region Project puts those agents and skills to effective use working with farmers.

2. This project also represents the first approach to an integrated regional development program which draws together several development ministries working toward a common goal. The Ministry of Agriculture is the lead ministry, drawing support from the Ministry of Livestock (Veterinary, animal production, and range), the Ministry of Mineral and Water Resources (water) and the Ministry of Public Works (roads). This coordinated approach is critical to successful long term development in the rural areas.

3. The Mission in developing its agricultural sector program has viewed integrated regional development as the keystone of the building block approach. This project, as our first regional development program is linked to several other projects in the USAID portofolio. As explained above, the Bay Region Project is directly linked to and dependent on Agricultural Delivery Systems Project, 649-0112. It uses the activities in agricultural intensification begun under the Agricultural Extension Project 649-0101 as a base for its activities. As discussed earlier, it draws a portion of the water development component from the Comprehensive Groundwater Project, 649-0104. The project will receive technical backstopping in range management and trained range agents from the Central Rangelands Project, 649-0108. It will be complimented by the primary health care delivery system in the Bay Region developed under the Rural Health Delivery Project, 649-0102. The data collection activity which is described in the evaluation section of the paper will draw demographic data from the vital statistics survey now being undertaken by the University of North Carolina at Chapel Hill under population funding. (See Annex IX).

Extension Methodology

1. Strengthening of the delivery system is critical to the revitalization of the small farmer segment of the Agricultural Sector. A means must be developed to take presently known, proven technologies and improved technologies which are developed and tested to the farmers for application. In an area with a strong oral tradition and only a newly developed written language, the only possible means is via an intensive person-to-person approach with established groups.

2. The pyramidal system of supervision and control offers the best opportunity to maximize the effectiveness of the scarce well trained staff. It utilizes a large number of supervised paraprofessionals as its base and thereby provides a mechanism for reaching large numbers of farmers.

3. The Agricultural Delivery Systems Project will provide a steady output of classroom trained extension agents with practical experience beginning in about year 4 of this Project. However, up until year 4 the Bay Region Project will train many of its own agents and after year 4 it will be necessary to provide a regular program of retraining and refresher courses to keep farm extension agents up-to-date on the technical packages and research results. (See Annex VII).

Agronomic

1. Substantial increases in crop yields and production can be realized by introducing appropriate technology requiring little capital investment. There is great potential for both intensifying production on presently cultivated land and for expanding production on presently unutilized lands. Technology levels on most farms are presently so low that the introduction of very inexpensive "minimum package" technologies would have large impacts on overall production.

2. Minor changes in cultural practices, already proven by use by a limited number of farmers, would raise yields substantially. Further extension of packages developed under the early Wyoming State effort would have dramatic effects.

3. The shifting of emphasis to consideration of a mixed farming system rather than crops as one enterprise and livestock as a separate enterprise is critical to long-term success. The livestock training to be added to the Agricultural Secondary School and the livestock, and farm management training to be conducted at FMETC under Project 649-0112 begin to form a nucleus of staff trained in both disciplines and their interaction. The Bay Region Project provides the opportunity to apply the theory to a real situation and demonstrates its effectiveness.

4. There is great interest and a correspondingly high potential for the use of animal traction both to expand cultivated areas by reducing the labor constraint and to increase yields on existing lands by improving the timeliness of operations by reducing peak labor demands. This is an area in which the residual effects of the Wyoming Team's project are most evident in their pilot villages. The fact that the use of animal traction has persevered for 10 years without any pressures from outside the village proves its perceived value to the farmers.

5. There is substantial potential for increasing crop diversification to include pulses, sesame, groundnuts and other crops. These have all been introduced and tried on a small scale for many years.

The adaptive research done under the Project on the Bonka Station will define the diversification package and assure its viability before extending it to farmers. The seed farm activity will provide a seed stock of the improved varieties for the extension effort.

6. Rainfall of 400-500 mm, spread over two seasons per year in heavy water-retaining soils such as are found in the majority of the primary agricultural areas, is sufficient to grow high yields of many crops including cereals, oil crops and fiber crops. Droughts in these areas are neither as frequent nor severe as much of the literature suggests. A review of the rainfall records for the years 1922 to 1940 and 1951 to 1971 for the Bay Region, indicates 7 years where the rainfall fell below 450 mm and only one time where it was below 450 mm for more than one year in a row.

7. It appears that the reason technologies, identified and introduced into pilot villages by Wyoming in the 1960s, were not spread more widely was a lack of follow-up in a well-structured extension service. Given the shift of government policy back to a small farmer program, the present project should be able to pick up where Wyoming left off and develop the delivery system to take the technology to a majority of the farmers. (See Annex VII).

Livestock

1. As discussed in the Agronomic Section, Livestock can make a definite contribution to productivity in the farming system. There is also significant potential for increasing the productivity of the herds themselves given proper integration.

2. Utilization of crop residues on a more systematic basis and more closely linking livestock to crops will improve productivity of the livestock through improved nutrition.

3. In socio-economic groups, such as those found in Somalia, where the farmers are also herders with herds and flocks as well as cultivated land the only reasonable approach is an integrated approach to the farming system.

4. Changes in herd management practices, including shifts in herd composition, could increase productivity per animal unit four to five times while requiring very little capital investment.

5. There is great potential for increasing yields through more selective breeding and better breeding management. The Somalis have an excellent reputation as good animal husbandrymen and women and further encouragement of outcrossing among local selected breeders, to say nothing of exotics, would have positive effects.

6. Animal health programs must precede the nutritional and breeding programs if the potential increases are to be realized. With minimum animal health inputs, mortality rates would decrease and reproduction rates would increase resulting in more efficient utilization of vegetative inputs and allowing an increased offtake.

7. As horizontal expansion takes place, range management practices must be incorporated into the farm systems practices. Land use planning must also incorporate the essential grazing allocations to support herds, both permanent and transient, in the area. The use of grazing associations linked to the provision of water has proven effective in other areas of Somalia. (See Annex IX).

Water

1. The lack of permanent water is a serious constraint in the region. Much of the presently uncultivated area is left uncultivated because there is no source of permanent water. Many present villages are inhabited only during six to nine months of the year because there is no water during the driest seasons. This is a limiting factor in the intensification of agricultural production because much of the land preparation required for moisture conservation should be done in the dry season to permit timely planting.

2. The geology of the Bay Region is dominated by two geological units: the basement complex and the Jurassic Limestone Formation. The former occurs in a large outcrop in the south of the Project area and is overlain unconformably by the Jurassic Formation which underlies the northern part of the Region. The limestone forms a prominent escarpment (the Baidoa Escarpment) in the central part of the area. This fades into more subdued topography to the west and east. The only other formation of significance are the wadi alluvials found in the channels of the drainage system on the Basement Complex.

The Basement Complex comprises a suite of ancient crystalline igneous and metamorphic rocks such as granites, gneisses and schists. These strata are highly deformed and faulted. Near ground surface there is a zone of weathering of variable thickness, where the parent rock has been decomposed into largely clay and silty debris. Physiographically, the basement complex outcrop is a flat featureless peneplain. Sometimes dramatically interrupted by spectacular iselbergs (or burs). The elevation of the peneplain is about 300 meters above sea level and it has a general slope towards the south at gradients of about 5 m per km or less.

The Jurassic Limestone is an extensive, predominantly calcareous formation, comprising the following units:

- the Uegit Suite - coralline limestone and calcarenite
- the Anole Suite - clastic limestones with marl and calcareous clay
- the Iscia Baidoa Suite - sandstones shales, conglomerates, limestones, marls and detrital limestones.

The total thickness of this whole sequence is at least 900 m. The lithology of the Iscia Baidoa Suite on the Baidoa Escarpment include layers of very hard massive limestone as well as soft chalky limestone, marl and clay. The hard limestone layers are very common and are always encountered in digging wells. The whole of the Jurassic succession has a general westerly and north-westerly dip. Over most of the Project area, these strata are almost flat and undisturbed except in the extreme east where contorted bedding can be seen on the ERTS imagery. Outside the Bay Region, the degree of deformation increases with relatively steep folding, particularly in the north-west, near the Ethiopian border. Within the Project area, the limestone outcrop forms two distinct physiographic units: the Baidoa Plateau and the Limestone Depression. The former is a flat featureless plain generally at elevations of more than 400 m above median sea level. It slopes gently towards the east and west from a low central ridge stretching northwards from Baidoa. Just to the south of Baidoa, the limestone outcrop forms a steep escarpment almost 100 meters high. The limestone depression is an area at the base of the escarpment, topographically level with the basement complex, underlain by the Jurassic Limestone Formation. It is a low, gently undulating plain in places gulleyed by run-off from the escarpment. The limestone outcrop has not been mapped and the full extent and thickness of the formation are not known.

3. There is some potential for surface water development through the construction of artificial drainages and surface reservoirs. The basement complex area with its complex geology is likely to receive the greatest emphasis on surface water development.

4. Generally, it is expected that wells with a six or eight inch casing will be used for the groundwater program. In the basement complex indications are that a 60 meter drilled well depth will be the mean with some possibility of dug wells reaching perched aquifers. In the Limestone Plateau area wells are likely to be much deeper down to 70 to 120 meters. On the escarpment and in the limestone depression the need for deep wells is minimal. There are numerous springs and shallow wells (20 m) with static water levels of only 8 meters. (See Annex X).

Economic

1. Given Somalia's balance of trade problems, the need to decrease imports and increase exports is undeniable. Since at present approximately 20% of the value of their imports are in the form of food (primarily cereals) and 30% of their food requirement is met by imports, a project to lay the base for increasing food production is critical to their development. Since livestock constitutes their primary export commodity (86%), the expansion of production in this sector will increase their limited foreign exchange earnings. In terms of overall government priorities, increasing staple food production ranks first and increasing exports ranks second.

2. Prices paid to farmers have recently been increased and are presently 1000 So. Sh. per ton for sorghum. This compares very favorably with the economic farm gate price of 1016 So. Sh. per ton at the official exchange rate. Of course at various shadow exchange rates the price compares less favorably with the economic price. Price adjustments have tended to lag somewhat behind market trends due to a lack of market information, but as they catch up are favorable. The Agricultural Development Corporation (ADC) was established in 1971 to purchase marketed surpluses of sorghum, maize, oilseeds, and cotton from farmers. The ADC has numerous local representatives who man buying stations in their villages but it does not have universal coverage. The spread between farmer price and wholesale is enough to allow ADC to pay reasonable stipends to buyers and there are plans to recruit buyers in all villages in agricultural areas.

3. Imported agricultural inputs are not utilized extensively in the country. Past experience has been to exempt them from duties and taxes and often subsidize their cost to farmers. Because quantities involved are limited, at this stage of development, the use of subsidies may be defendable as a means of familiarizing farmers with new techniques. However, at a later stage, they become difficult to remove and could put an excessive burden on the Government budget and cause price distortions leading to an inefficient allocation of the Government's resources. The project is designed to minimize the reliance on imported inputs in its early years (up to a generation), until the factors of production clearly indicate an efficiency to be gained from their use. It is felt that placing reliance on inputs which can be made attractive financially to farmers through subsidies, while not giving true economic benefit, is not a prudent course for the donors to encourage.

4. On a micro basis, the agronomic and livestock interventions that have been proposed can significantly increase the financial returns to farmers. Net returns per cultivated hectare are projected to increase some 300-400% and net returns to labor over 800% over the 20-year period of impacts. In livestock, the potential increase in net returns is over 1000% per animal unit. (See Annex XII).

Social Analysis

1. The people of the region have strong local traditions of mutually supportive self help associations which have been further strengthened by the GSDR cooperative movement. Therefore, "Key farmers" selected as the focus of extension efforts should be chosen from such associations (formal or informal) to encourage the multiplier effect. Although the Baidoa district exhibits a large official cooperative structure its less formal association structure appears weakened by the urban and civil service nature of the population. The self help association system is better developed and better demonstration effects early in the project are likely to be realized in the other districts, particularly Bur Acaba.

2. Popular participation in the direction of the project can best be encouraged through the development of the District Crop and Livestock Advisor Committees which will be made up of active husbandmen and women. This will provide a forum for several key farmers to air their views and present suggestions directly to higher echelons without going through the Farm Extension Agents.

3. In the Bay Region a unique linguistic situation occurs where the residents speak a dialect (Af-may-may) which, although it comes from the same base, has sufficient variations in vocabulary and pronunciation to impede communications. The variance can best be equated to the variance between French Canadian and French or Cockney English and American. Therefore, attempts should be made to recruit Af-may-may speakers as agents when possible, sensitize agents to the linguistic variations and provide local language training in Af-may-may for technicians.

4. As part of the initial studies activity (baseline data, hydrogeologic , land use capability, etc.) the sociologists and economists financed by IBRD and AID should focus on the collection of micro socio-economic data collection relating to the farming system.

The Role of Women

More than in other parts of Eastern Africa, women in Somalia play a vital role in rural development and exercise considerable economic authority. Not only do they constitute a significant portion of the labor force but also they actively participate in the household decision making process, share responsibility for managing small stock, have special ownership rights of small stock, etc. They have taken a rapidly increasing role in local government, having increasingly taken advantage of education opportunities and with the support of the government have asserted their equality. In order to strengthen this affirmative action, the project will recruit women as agents (Project 649-0101 already has one female agent who is experiencing no significant problems), consider the women's needs for potable water in designing well head and reservoir facilities, test and distribute technologies which will lighten traditional women's tasks (threshing, milling, etc.) and include women as representatives on district crop and livestock advisory committees.

Institutional

1. The Bay Region Project represents Somalia's first experiment with decentralized integrated development. The management system using the PMU as the primary agent to effect the decentralization and to assure interagency coordination is managerially sound. Regionally based rural development is appropriate as an effort to institutionalize decentralization in Somalia.

2. The PMU serves as the focal point for management, coordination and planning. It receives policy guideline from the formally constituted Inter-ministerial Coordinating Committee. It is operationally responsible to the Ministry of Agriculture and receives technical advice at the regional level from the regional technical coordinating committee composed of regional technical directors of the services involved. It also receives feedback from the grass roots through the district crop and livestock committees which are made up for husbandmen and women who are actively participating in the program.

3. Present government salaries are dysfunctionally low. The provision of allowances, as financed by the IBRD in this project, is only a temporary solution. This issue should be addressed in a macro context as suggested in the USAID CDSS for 1982 giving full consideration to the government-wide fiscal implications, the added inflationary implications, etc. Within the project the IBRD has made the move to standardize allowances between the various ministries involved in the project. This is as far as it is possible to go within the context of the project.

Environmental

An IEE was prepared and submitted with the PID. The negative determination was accepted subject to the following conditions:

1) Incorporation of a training element in the project for pesticide handlers,

2) Deletion of inference that Furadan can be handled with barehands, and

3) Prior to use of AID funds for procurement of any pesticide, an Environmental Assessment will be undertaken on that pesticide.

In response to these issues the PP development team has developed the following points which have been incorporated into a revised IEE.

1) Training programs organized and led by a US registered Plant Control Specialist have already begun. Two courses have been held which have trained extension agents as applicators of seed treatment chemicals. Plant protection skills continue as part of the technical assistance under the Bay Region Project. The Project will introduce primarily non-chemical pest control activities such as crop rotations, clearing of crop residues and timely planting. The Agricultural Delivery Systems Project also incorporates a long term plant protection specialist who will perform two functions, train new extension agents in pest management including application of pesticides and also develop national approaches and policy regarding plant protection.

2) All reference to bare handed handling of Furadan have been deleted. In the early training courses the importance of safe handling have been emphasized. Gloves, aprons, goggles, respirators, etc., have been ordered for use by applicators to permit proper protection.

3) Under Project 649-0101 possible chemicals for future use have been identified and initial guidelines for their use have been prepared. Risk benefit analysis are to be undertaken.

After reviewing the revised IEE, the PP team which includes the Mission Environmental Officer recommends that the Assistant Administrator approve the negative determination.

Financial Analysis and Plan

The financial analysis on this project focussed on the implications of the rapidly increasing inflation and its effects on the costs of the AID components and on the components financed by other donors. Table I presents a summary of project costs. Table II presents a summary of donor financing.

Table I. Project Cost Summary

Component	USAID	IDA/IFAD/GOS	ADF/GOS	Total
Ag. Intensification	5,237	5,773	-0-	11,010
Water supplies	4,874	2,823	-0-	7,697
Access roads	-0-	2,172	9,031	11,203
Project management	-0-	3,201	-0-	3,201
National evaluation (data)	464	2,284	-0-	2,748
Inflation and con't	5,181	6,528	2,698	14,407
Total	15,756	22,781	11,729	50,266

Table II. Donor Financing

(In thousands of U.S. dollars)

IDA	12,000
ADF	8,900
USAID - 0113	11,171
USAID - 0104	3,685
USAID - 0101	900
IFAD	8,000
GOS	5,610
Total	50,266

The IBRD in estimating their costs used the following assumptions:

1. Base costs are as of September 1979,

2. A 10% physical contingency is allowed on all costs, and

3. Inflation is allowed at the following rates:

   6 percent on equipment
   7 percent on civil works
   8 percent on local costs

   Actual calculated inflation averages about 7 percent per year for the IFAD/IDA/GOS components and just under 6 percent for the road component.

The base costs in most cases were considered reasonable for all components except for the roads component, but the inflation rates are much too low.

Considering the financing packages of the other donors separately and defining possible solutions for each package is the approach taken in this analysis.

First, with the IFAD/IDA/GOS package, the total cost of their component was calculated at $22,781,000 with $15,211,000 being foreign exchange and $7,570,000 being local currency costs. The local currency costs, which are primarily salaries, are not subject to excessive inflation. Furthermore, with the anticipated revaluation, there could be savings in this area as dollars provided buy more shillings.

The dollar costs of this package are budgeted as follows:

	('000's dollars)
Civil works	1,600
Vehicles and equipment	400
Materials	3,800
Technical assistance	5,300
Training	400
Total base	11,500
Contingency	550
Inflation	3,261
	15,211

The materials are the largest cost which has significant inflation. They are spread equally over the entire six years. At 12 percent annual inflation, the total inflation will be equal to about $2,000,000 on this item. Technical assistance can probably be held to 6 percent inflation or about $1,000,000 over the life of the project. Inflation on the civil works component is likely to be more in the area of 15-20 percent and if phased out to year 3 and beyond as planned, the dollar cost of inflation is likely to be in the range of $1,000,000. In order to

offset this increase which exceeds the amount available for inflation, USAID will contribute the eight houses being constructed under project 0101 along with the sites and service work to accompany them.

With the contribution of the eight USAID houses to offset construction cost increases and holding to a 6 percent annual increase in Technical Assistance salaries and with the forthcoming revaluation to provide relief in the local currency budget, the funds available should be sufficient. The PMU will make every possible effort to move procurement up to the earlier years to avoid costly price increases in materials and supplies, particularly construction supplies and large equipment.

In the roads component financed by the ADF, our estimates indicate that the base costs are low and that the inflation factor is low. The solution to this situation is to view the program as reaching its goal of providing access rather than viewing its inputs. The project planned the following program of primary and secondary roads:

6 meter roads	73 km on Black Cotton
	213 km on good soils
4 meter roads	120 km on Black Cotton
	90 km on good soils

Construction of all weather standard roads on the Block Cotton soils is a very expensive undertaking due to the need for a great deal of excavation and fill and drainage works to overcome the expansive nature of the soil. However, the alignment of the proposed roads parallel existing roads and there is significant scope for focussing the road construction effort primarily on the impassable sections of road and merely grading the remainder. There is also some scope for providing only drainage structures on the existing tracks to eliminate rainy season obstacles rather than rebuilding the entire road. The PMU is hiring a roads engineer as one of the initial staff on the project. He will initially redefine the program to fit available funds and revise the equipment lists to fit the needs of the revised program. It is felt that the number of kilometers of road may need to be decreased but that by using existing roads and tracks access can be provided to all areas.

In the AID component, the base costs were re-estimated based on actual costs bid in the United States on other USAID projects as of January 1980. Inflation was applied at the rate of 12 percent per annum to all items.

Given the high cost of inflation, procurement of major materials in the water development and agricultural intensification components was moved up to the earlier years of the project with plans to store these non-perishable materials until needed. Furthermore, agreement was reached with the project manager that the land use surveys planned by the IBRD would be moved up to year 1 and 2 of the project so that the results can be used during the project. Otherwise USAID would have financed similar surveys early in the project to provide essential working information. The USDA team presently financed under project 649-0101 will provide most of the technical assistance for the first 1-1/2 years of the agricultural intensification program in the project. The non-commodity portions of the Water Supply component valued at $1,300,000 for equipment and $2,000,000 for technical assistance are financed under the AID Comprehensive Groundwater Project 649-0104. These actions reduced the cost to USAID of their components from $14,225,000 to $11,171,000 while maintaining the integrity of the project and fulfilling our total commitment to the project. This represents an increase of approximately $2,000,000 over the preliminary budget in the PID. This increase is primarily due to the rapid increase in shipping costs over the past six months and the higher rates of inflation which we now realize are likely to be prevalent over the life of the project.

The AID contributions through project 649-0113, Bay Region Development are summarized in Table III with details provided in Table IV. Project 0113 financing is heavily front-end loaded due to the attempt to avoid excessive inflation costs. Over $5,000,000 must be provided in FY 80 and FY 81 to permit this up-front procurement. Delays in providing funds will significantly increase the total cost of the project.

Table IV presents a summary of funds provided through other USAID projects, Comprehensive Groundwater (649-0104) which is providing drilling equipment and technical assistance for the Water Development Component and Agriculture Extension Training and research (649-0101) which provides the technical assistance for the first year and a half of the Agricultural Intensification component.

Table III. USAID Contributions 0103

(In thousands of U.S. dollars)

	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Total		Total
	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX	LC	FX & LC
Ag. Intensification	1,100	239	300	57	868	-0-	657	-0-	657	-0-	657	-0-	4,239	296	4,535
Water Supply	2,000	574	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	2,000	574	2,574
Data Collection	200	-0-	120	-0-	24	-0-	48	-0-	24	-0-	48	-0-	464	-0-	464
Inflation and Con't	800	153	160	21	488	-0-	514	-0-	638	-0-	824	-0-	3,424	174	3,598
Total	4,100	966	580	78	1,380	-0-	1,2191	-0-	1,319	-0-	1,529	-0-	10,137	1,034	11,171
Total FX & LC	5,066		658		1,380		1,219		1,319		1,529		11,171		

Note: LC in this table relates to procurement from Kenya if the shelf item expansion waiver is approved.

Table IV. Detailed Budget

Bay Region Project 649-0113

ITEM	Unit Price (Jan 1980)	Year 1 FY-80		Year 2 FY 81		Year 3 FY 82		Year 4 FY 83		Year 5 FY 84		Year 6 FY 85		TOTAL
I. Intensification of Ag System														
A. Extension/Research/ Seed Multiplication														
1. Technical Assistance														
a) Extension Spec.	P.Y. 85	.5	*	1	*	1	85	1	85	1	85	1	85	340
b) Ag Research Off.	P.Y. 85	.5	*	1	*	1	85	1	85	1	85	1	85	340
c) Seed Farm Man.	P.Y. 85	.5	*	1	*	1	85	1	85	1	85	1	85	340
d) Consultants	P.M. 12	6	*	10	*	10	120	10	120	10	120	10	120	480
2. Training (L.T.)	P.Y. 18	0	0	2	36	4	72	4	72	4	72	2	72	324.0
3. Commodities														
4WD Wagon	ea 8.2	2	17		0		0		0		0		0	17
4WD P.U.	ea 8.1	4	33		0		0		0		0		0	33
Truck	ea 25	1	25		0		0		0		0		0	25
Tractor 60-75 hp	ea 15		0	2	30	2	30		0		0		0	60
Tractor 120 hp	ea 35		0		0	1	35		0		0		0	35
Animal Trac. Equip.	ea .5	10	5		0		0		0		0		0	5
Misc. Research	sum		5		0		0		0		0		0	5
Camp Equip.	set 1	7	7		0		0		0		0		0	7
Lab & Stores	sum		18		0		0		0		0		0	18
Office Equipment	sum		26		0		0		0		0		0	26
Meteorology	sum		7		0		0		0		0		0	7
Large Farm Equipment	sum		0		67		0		0		0		0	67
Workshop Tools			10		0		0		0		0		0	10
Seed Packaging			0		4		0		0		0		0	4
Spare Parts	20%		25		11		13							49
Shipping	70%		107.5		28		45							180.5
Procurement Fees	7%		9		4		5							18
Total I - A			294.5		180		575		447		447		447	2,390.5
B. Range and Livestock														
1. Technical Assistance														
Range	P.Y. 85	.5	*	1	*	1	85	1	85	1	85	1	85	340
Veterinary	P.Y. 85	.5	42.5	1	85	1	85	1	85	1	85	1	85	467.5
2. Training														
Range	P.Y. 18		0	1	18	1	18	1	18	1	18	1	18	90
Veterinary	P.Y. 18		0	1	18	1	18	1	18	1	18	1	18	90

ITEM	Unit	Unit Price (Jan 1980)	Year 1 FY-80	Year 2 FY 81	Year 3 FY 82	Year 4 FY 83	Year 5 FY 84	Year 6 FY 85	TOTAL
3. Commodities									
4WD wagon	ea	8.2	2 16	0	0	0	0	0	16
4WD P.U.	ea	8.1	7 57	0	2 16	0	0	0	73
Truck 5 ton	ea	25	2 50	0	0	0	0	0	50
Bulldozer 140 hp	ea	120	1 120	0	0	0	0	0	120
Survey equipment	sum		4	0	0	0	0	0	4
Camp equipment	set	1	15 15	13 13	0	0	0	0	28
Hand tools	sum		3	3	2	2	2	2	14
Office furniture	sum		15	4	0	0	0	0	19
Markers	sum		8	7	0	0	0	0	15
Drugs	sum		225	0	0	0	0	0	225
Vaccine Equipment	sum		0	0	32	0	0	0	32
Spare Parts	20%		58	0	0	0	0	0	58
Shipping	70%		392	26	35	2	2	2	459
Procurement Fees	7%		39	3	4	0	0	0	46
Total I -B			1,044.5	177	293	210	210	210	2,144.5
Total I			1,339	357	868	657	657	657	4,536
II. Water Supply									
A. Commodities									
Casing	100mm	4	58 230	0	0	0	0	0	230
Screen	100mm	6	23 140	0	0	0	0	0	140
Pumps	ea	6	60 360	0	0	0	0	0	360
Generators	ea	10	60 600	0	0	0	0	0	600
Hand pumps	ea	.5	30 15	0	0	0	0	0	15
Spares	20%		193	0	0	0	0	0	193
Shipping	70%		942	0	0	0	0	0	942
Procurement Fees	7%		94	0	0	0	0	0	94
Total II			2,574	0	0	0	0	0	2,574
III. Studies - Data Collect	P.M.	10	20 200	10 120	2 24	4 48	2 24	4 48	464
Total			4,113	477	892	705	681	705	7,573
Physical Cont	10%		411	48	90	70	68	70	757
Inflation	12% p.a.		542	133	398	444	570	754	2,841
			5,066	658	1,380	1,219	1,319	1,529	11,171

Table V. USAID Contributions by Other Projects

(In thousands of U.S. dollars)

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total
Ag. Intensification (0101)	280	620	-0-	-0-	-0-	-0-	900
Water Supply (0104)							
Rigs & Equip.	1,100	800	250	200	-0-	-0-	2,350
T.A.	85	250	250	300	250	200	1,335
Total Water	885	750	350	300	85	30	3,685
Total	1,127	1,210	250	300	85	30	4,585

Implementation:

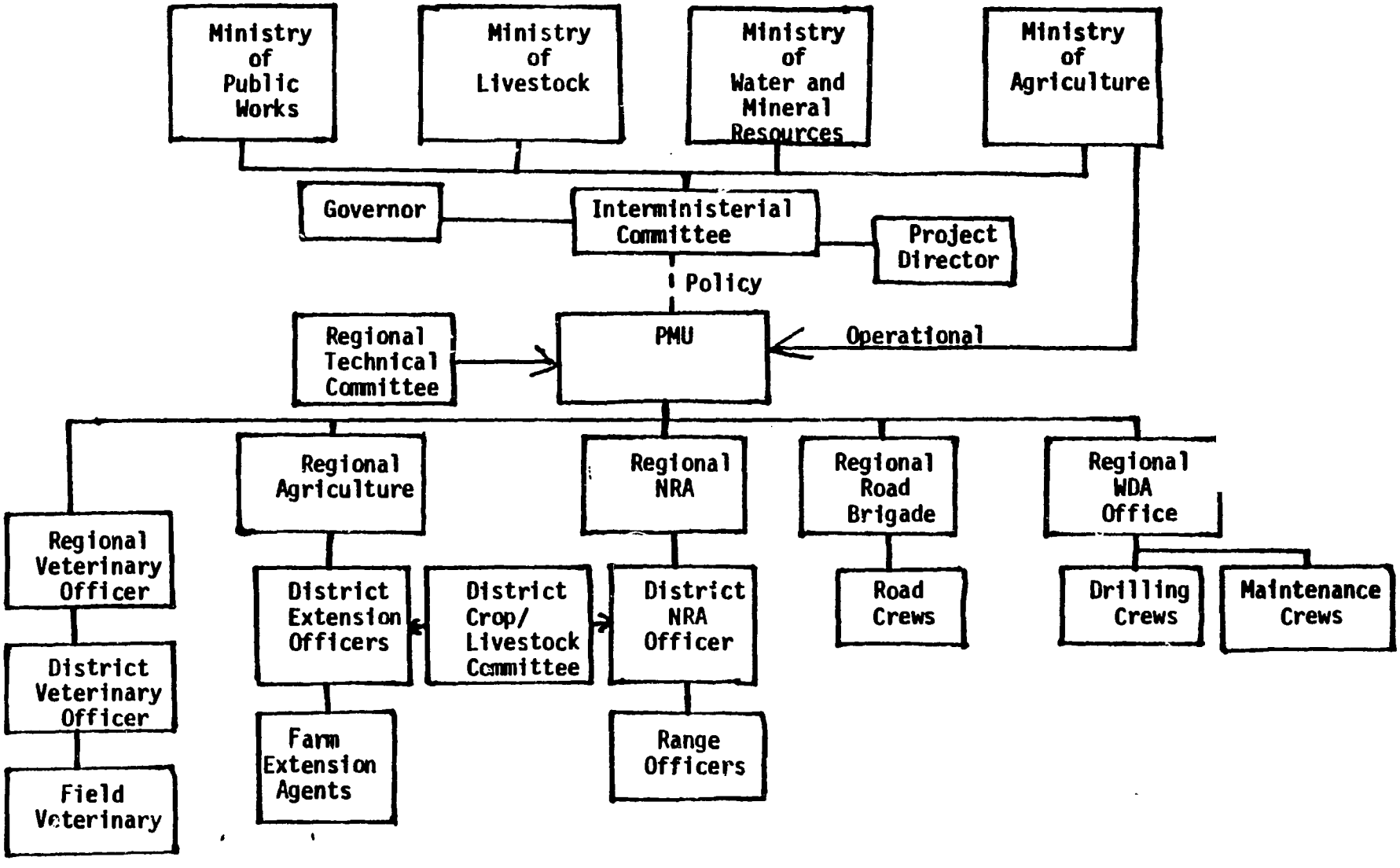
Organization

The responsibility for project implementation will rest with the Ministry of Agriculture. A Project Management Unit (PMU) will be established as an independent operating organization reporting directly to the Director General of Agriculture. The PMU will consist of a Somali Project Director who will be responsible for the execution of the project as agreed upon by USAID and other donors. A project technical manager, (internationally recruited) will be selected by the MOA who will assist the Project Director in the execution of the project and will provide the technical direction and supervision necessary to develop the project as outlined in this and other supporting documents. He/she will be responsible for the overall technical direction of the project and coordinate the activities of all donor agencies as well as the technical inputs of the various GSDR agencies that will be involved with the Project. The third member of the PMU will be an internationally recruited financial controller who will be responsible for the disbursement of funds, budget control, procurement and general operational activities. He/she will work under the supervision of the Project Director and the Project Technical Manager.

The PMU will be the operational entity responsible for all the GSDR activities relating to this Project within the Bay Region Project area. This responsibility has been given to the Project Director by a governmental decree. This decree states that a coordinating committee of the appropriate ministry of State will oversee the PMU. The Project will have its separate operational budget and personnel from other G.S.D.R. ministries and agencies will be seconded to the Project for management by the PMU. These will include the personnel of the regional office of the Animal Health Service of the Ministry of Livestock, Forestry and Range (MLFR) and the activities of the National Range Agency (NRA), a semi-autonomous agency of the MLFR, and the Water Development Authority (WDA). New technical staff would also be hired to meet the needs of the work program. WDA would also make available to PMU all its facilities in Baidoa such as office accommodation, workshop and storage space. The various ministries involved will also continue to supply central level backstopping and support to the seconded regional services. The Project's roads will be constructed by the Ministry of Public Works (MPW) through a forced account under the aegis of the PMU, supported by technical assistance staff responsible to the PMU.

The general technical and administrative coordination of other Ministry of Agriculture activities such as the research and training at the Bonka Station, the seed multiplication farm and extension activities will come under the PMU. This will permit all phases of project implementation to come under one single decentralized body which looks to an interministerial committee over all policy guidance and direction.

SCHEMATIC OF ORGANIZATIONAL STRUCTURE



The interministerial project committee which is composed of all the ministries concerned plus the Regional Governor and the Project Director provides overall policy guidance to the PMU. It will serve as the primary focus for assuring cooperation and coordination at the highest level and will allocate the resources of various ministries to the project.

In order to provide support to the PMU and to assure smooth operation of its activities, the GSDR will establish a Regional Technical coordinating committee with a member from each of the ministries and independent agencies involved as described above. The Project Director should be the Chairman of the Committee and be responsible for arranging periodic meetings to review project plans, accomplishments and suggest desired changes in direction or Project emphasis. The Project Technical Manager and the Financial Controller should be exofficio members of this committee. USAID and the other donors will also be asked to provide representation at these meetings. The Technical Manager would be responsible for providing an analysis of the accomplishments of the Project, the projected work plan and suggestions for changes in timing or emphasis in any of the various activities involved. The Financial Coordinator would report on the Operating Budget, expenditures to date and a financial analysis of planned expenditures.

This Committee would be the mechanism that would provide the required flexibility in project emphasis.

District crop and livestock advisory committees composed of husbandmen and women actively involved in the Agricultural Intensification Program will be formed. These committees will provide an additional measure of popular participation by providing a forum for agriculturalists to express their perceived needs to the planners and managers.

Administrative Arrangement:

1. Technical Service: The timely provision of the needed technicians will be essential to the success of this Project.

In the interests of saving money, accelerating implementation and assuring continuity and coordination, USAID and the Ministry of Agriculture have agreed that the Technical Team from USDA, which is implementing project 649-0101, will be absorbed into the Bay Region Project to provide the skills for the first 1-1/2 years of the Bay Region Project. At the end of the first year, their performance will be evaluated and a decision made to either continue with USDA or competitively seek a contractor to complete the project.

2. Training: Training needs will be identified by the various entities that are responsible to the PMU. Proposed trainees will be screened by the PMU who will make the final selection. The training plans will be developed by the PMU and the nominees will be processed by USAID/Somalia utilizing the standard PIO/P Procedure.

3. Commodities: The PMU will hold primary responsibility for the procurement of commodities based on Chapter three of Handbook 11. All commodities will be procured from Geographic Code 000 and 941 countries according to competition procurement procedures. Consolidation and standardization of procurement actions by the various donors will be coordinated by the PMU. The PMU will also be responsible for contracting with a Procurement Services Agency and developing specifications on commodities.

A sole source/procurement waiver has been granted for AID project financed vehicles for all projects authorized in 1978, 1979, and 1980. This is based upon a competitively bid standardization program which originated in our first project (649-0101) and has been followed in each project.

Due to the severe shortage of materials and goods in Somalia, we request expansion of the shelf Item rule to allow items available off the shelf in Kenya to be treated as if they were local shelf items. This would particularly apply to agricultural tools, small equipment, furniture, camping equipment, etc., which are locally fabricated in Kenya and not available in Somalia.

Implementation Plan

The management of this project will be complicated by its multi-faceted nature. This project attempts to amalgamate the efforts of several donors. It combines either directly (groundwater development) or indirectly (agricultural services and agricultural delivery systems) the efforts of three other AID projects, further complications are caused by the inclusion of activities of several different GSDR ministries and semi-autonomous agencies; USAID, the other donors, and the GSDR were aware of these problems but developed this project after a careful analysis indicated that it would be possible to avoid the constraints and that the possible areas of conflict could become positive factors in effective project development. As mentioned above, the GSDR has established the PMU with complete operational authority for those activities contained in this project. A candidate acceptable to USAID/Somalia has been identified by the GSDR for the Technical Manager and the PMU will begin functioning no later than July 1, 1980.

The entire concept of the project has been discussed with representatives of the various ministries and agencies and their cooperation has been assured. Some inter - ministerial and departmental differences remain to be worked out but the concept has been accepted. The inevitable time constraint in building houses and facilities, ordering equipment and vehicles, and securing the required technical assistance remains.

The situation is favored, however, by Mission awareness of the problems and by support activities that have been started for the other related projects. If required, it will be possible to arrange a transfer of vehicles within the MOA for the start up activities of this project. Housing that is being constructed in Baidoa under Project 649-0101 will ease the strain on housing suitable for expatriate staff. Field work that has been accomplished under this same Project will provide some of the base line data for the surveys that will be required under this Project. The Agricultural Delivery Systems Project (649-0112) should begin effective operations during the same time period that this Project becomes fully operational and their activities will complement the project.

IMPLEMENTATION SCHEDULE

Time Period	Action	Action Agent
July 1 - 80	Establish PMU	MOA
Oct. 1	Funding available BRDP	GSDR-AID-IBRD
July-Oct.	PMU Organizes administratively	PMU
Oct.-Dec.	Prepare PIO/C's for equipment and vehicles	PMU/USAID
Oct.-Dec.	Contract for principal civil works	PMU
Oct.-Dec.	Develop force account contract with MPW for highway construction	PMU
Jan.-March-81	Arrival of Social Anthropologist	PMU
	Selection of technical assistance contractor	
April-June	Selection of contractor to develop land use survey	PMU

Time Period	Action	Action Agent
April-June	Arrival of Comprehensive Groundwater Project personnel	USAID
April-June	Decision regarding USDA continuation	PMU
July-Sept.	Final Sociological report	PMU
July-Sept.	Arrival Land Use Survey Group	PMU
July-Sept.	Arrival of First Commodities	PMU
July-Sept.	Development of technical assistance programs	PMU
Oct.-Dec.	Arrival of well drilling equipment and beginning of program in Bay Region	PMU
Oct.-Dec.	Selection of first participants	PMU
Jan.-March-82	Completion of civil works	PMU
Jan.-March	Continuation of all activities	PMU
April-June	Preliminary report from Land Use Survey Group	PMU
April-June	Continuation of other activities	PMU
April-June	Assignment of short term consultants as required	PMU
April-June	Selection Second Group of Participants	PMU
July-Sept.	Departure first group of participants	PMU
July-Sept.	Determination on PADU's or alternative method	PMU
July-Sept.	Continuation of all other activities	PMU
Oct.-Dec.	Establishment of first PADU	PMU
Oct.-Dec.	Departure second group of participants	PMU

Time Period	Action	Action Agent
Oct.-Dec.	Preliminary evaluation of project	USAID/IBRD
Oct.-Dec.	Final report land use survey group	PMU
Oct.-Dec.	First wells in production	PMU/USAID
Jan.-Mar'83	Project design modifications and development of implementation schedule for second part of first phase of the project.	

Evaluation

USAID and other donor experience indicates that one of the main problems in formulating projects and programs has been the weakness of the data base. This also impinges on the capability to evaluate impacts.

In this project as in the other USAID projects a significant data collection and institutionalized evaluation component is designed into the project.

In the initial two years of the project the focus will be on the collection of baseline data and formulation of a land use capability plan. AID provides financing for baseline socio-economic production and household data. This data collection effort will take up where the demographic survey presently underway by the University of North Carolina at Chapel Hill leaves off. It will collect and analyze data on the existing production system, on the current use of household funds, current agricultural and nutrition practices, land tenure system, etc. (See Annex XV for the scope of work).

The land use capability survey financed by the IBRD will be based on existing aerial photos with additional air surveying and ground truthing. It will provide data on current cultivated hectarage, potential cultivable hectarage, etc., as well as a plan for land usage. (See Annex XV for additional details).

The IBRD is also financing the development of a National Monitoring and Evaluation Facility within the State Planning Commission. This office will be responsible for assisting the project to monitor and evaluate progress including the design of the monitoring system, developmentof questionaires, and assessment and assistance in analysis of data generated. The IBRD has provided funds to purchase 15 person months of data collection in the Bay Region. Evaluation within the project, under the National Monitoring and Evaluation Facility will be continuous. Field reports from extension, veterinary, and range staff will be standardized for inclusion in summary monthly reports.

Funds have been provided in AID's project financing for external evaluations in years 4 and 6 of 4 person months each time. These evaluations will focus primarily on project progress and impacts on the target groups. Of particular interest will be the changes in production coefficients due to the technical packages introduced, the numbers of hectares under improved cultivation methods, the number of agriculturalists affected by the program, the real benefits of the water development program, the amount of "spontaneous" development resulting from the access roads and water development program, and the effectiveness of the PMU as a coordinative and management structure.

Conditions, Covenants, and Negotiating Status

The project was designed in coordination with the GSDR project manager. The components have been discussed with each participating ministry and with the IBRD who is serving as coordinator of the other donor inputs. The analyses presented in the paper have been reviewed in detail by the project manager and the Ministry of Agriculture and they concur in all recommendations. After reviewing the project paper, the GSDR project manager met with all involved ministers and directors general; the agreement of all parties was gained. USAID Somalia forsees no negotiating problems in moving to the signing of the project agreement.

We recommend the inclusion of the following special conditions precedent to initial disbursement of AID funds:

1. Pursuant to the presidential decree establishing the PMU, all NRA, Ministry of Livestock, Ministry of Agriculture, and WDA staff are seconded to the project as evidenced by letter of agreement between PMU and the agencies and ministries; and

2. Land and facilities for adaptive research component, seed farm component allocated by Ministry of Agriculture to PMU.

In addition, the standard condition requiring submission of specimin signatures will be incorporated into the agreement.

USAID does not recommend a condition of cross effectiveness with other donors because our components are not directly dependent upon the others for immediate support. The agreements for the IDA, IFAD, and ADF loans are executed and the government is in the process of meeting their conditions. All except the execution of the AID grant agreement should be met before June 1.

The mission suggests the following special covenants in addition to the standard evaluation covenant.

1. The cooperating country agrees to appoint the required Somali staff in a timely manner to meet the training and operational needs of the project; and

2. The cooperating country agrees to recruit international staff with experience and qualifications satisfactory to AID.

ANNEX 1

Logical Framework

	Narrative	Objectively Verifiable Indicators	Critical Assumptions
Goal	To assist the GSDR in achieving self-sufficiency in food production	1) Termination of imports of grains and legumes	1) Political conditions in Bay Region remain conducive to increased land development. 2) Government's commitment to agricultural development and suitable price structure maintained.
Purpose	To increase agricultural production in the Bay Region through the development of necessary institutions, personnel, and infrastructure	1) Increase in ADC purchases in Bay Region - 840 MT - yr 6 (ADC Records) 2) Increase in local consumption of Livestock (baseline studies). 3) Livestock exports from Bay Region increased 4% - yr 6 (GSDR stat. abstract)	1) Prices paid by ADC to farmers remain competitive 2) No extended drought periods.
Outputs	1) Improved supply of potable water 2) Improved transport system 3) Increased livestock offtake 4) Increased sorghum and pulse production 5) National staff trained	1) 100 boreholes, 10 dug wells, and 4 uars. 2) 350 km feeder roads, 250 km access 3) 4% increase (yr 3) in cattle offtake, 4% increase (yr 6) sheep and goats. 4) 1,525 MT incremental production of sorghum (yr 5), 450 MT incremental pulse production (yr 5).	1) Government personnel/salary structure conducive to supply of needed staff. 2) Other donors supply critical inputs in timely fashion 3) Participants selected inaa timely fashion.
Inputs USAID	1) Commodities 2) Technical assistance 3) Participant training	1) Seed farm established wells drilled 2) 21.5 person years; 56 pm 3) 26 person years long term	1) Infrastructure provided by other donors in a timely fashion 2) Participants identified in a timely fashion

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 Security Supporting Assistance funds.

A. GENERAL CRITERIA FOR COUNTRY

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 consistent pattern of gross violations of internationally recognized human rights?

   All AID Projects in Somalia have been designed to directly benefit the rural poor population.

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.

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.

4. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) [illegible] has exhausted available legal remedies and (b) debt is not denied or contested by such government?

   No.

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.

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6.	FAA Sec. 620(a), 620(j); App. Sec. 107, 114. 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?	No.
9.	FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason?	No.
10.	FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters, a. has any deduction required by Fishermen's Protective Act been made? b. has complete denial of assistance been considered by AID Administrator?	N/A
11.	FAA Sec. 620(q); App. Sec. 503. (a) Is the government of the recipient country in default 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, unless debt was earlier disputed, or appropriate steps taken to cure default?	(a) No (b) No
12.	FAA Sec. 620(s). "If contemplated assistance is development loan (including Alliance loan) or security supporting assistance, 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, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)	N/A

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? — Country is not in arrears.

15. FAA Sec. 620A. 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.

B. FUNDING CRITERIA FOR COUNTRY

1. Development Assistance Country Criteria

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

(a) (1) yes
(2) - (5) basestudies being conducted currently
(6) yes
(b) yes

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5C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a sub-category for criteria applicable only to loans); and Security Supporting Assistance funds.

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

A. GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b); Sec. 671

   (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

   (a) CN will be submitted.
   (b) Yes.

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?

   (a) Financial Plan in PP.
   (b) USAID's component consists of technical assistance, commodities, and training; estimates are reasonably firm.

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?

   Project Management Unit has been established by Presidential Decree. No further legislative action necessary.

4. FAA Sec. 611(b); App. Sec. 101. 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 Related Land Resources dated October 25, 1973*?

   Water compenents to be provided under Groundwater Projec (649-0104).

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 the country's capability effectively to maintain and utilize the project?

   Construction financed by IFAD/IDA/GSDR, no construction financed by AID.

6. FAA Sec. 209, 619. 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. If assistance is for newly independent country, is it furnished through multilateral organizations or plans to the maximum extent appropriate?

   Project does not lend itself to regional approach, however it will be making use of Regional Agronomic Research Institutions such as ICRISAT.

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7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). 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.	a) Yes, agricultural inputs will be imported from U.S. Production increases will stimulate increased international trade; b) yes, private farmers are nucleus of extension efforts; c) yes, farmer coops already operating in Bay Region will be first contacts. d) N/A; e) both ag production and marketing will receive technical inputs f) 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).	A major proportion of the procurement will be of U.S. souce of origin.
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 GSDR will contribute local salaries, vehicles and materials for a total of $5.6 million.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency 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, CBD notice will be published and RFTP submitted to all interested contractors.
12. FY 80 App. Act Sec. [521.] If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?	Self-sufficiency in food production is goal; export commodities not involved.

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, by extending access to economy at local level, increasing labor-intensive production and the use of 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?

a) A majority of the farmers in Bay Region farm 1-5 hectares. These are target group of project and will be increasingly involved in rural economy. Minimum input technical packages will be defined. Appropriate technical assistance will be sought from U.S. institutions.
b) Cooperatives will be eligible for technical assistance.
c) Cooperatives are basis of self-help efforts.
d) Women will be represented on district advisory boards to ensure participation in decision-making.
e) Regional participation is not feasible at this time.

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

(1) [103] for agriculture, rural development or nutrition; if so (a) extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, full account shall be taken of the needs of small farmers and extensive use of field testing to adapt basic research to local conditions shall be made; (b) extent to which assistance is used in

coordination with programs carried out under Sec. 104 to help improve nutrition of the people of developing countries through encouragement of increased production of crops with greater nutritional value, improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration programs explicitly addressing the problem of malnutrition of poor and vulnerable people; and (c) extent to which activity increases national food security by improving food policies and management and by strengthening national food reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

(2) [104] for population planning under sec. 104 (b) or health under sec. 104 (c); if so, a. extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest, 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.

(4) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education more elevant, especially for rural families and urban poor, or strengthens management capability of institutions

b) (1) [103]
Project is geared toward increasing production by 1) providing minimum input technological packages based on upgrading current cultivation and animal husbandry and upon research currently being conducted in the Bay Region. 2) upgrading extension services and infrastructure. Increase in production will result in increased income. National food reserves will be increased under the project and improved storage techniques promulgated. Establishment of seed farm based on farmers needs will result in availability of improved, locally adapted seeds and reduced losses.

enabling the poor to participate in development; and b. extent to which assistance provides advanced education and training of people in developing countries in such disciplines as are required for planning and implementation of public and private development activities.

(5) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is: (i) (a) concerned with data collection and analysis, the training of skilled personnel, research on and development of suitable energy sources, and pilot project to test new methods of energy production; and (b) facilitative of geological and geophysical survey work to locate potential oil, natural gas, and coal reserves and to encourage exploration for potential oil, natural gas, and coal reserves.

(ii) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organization;

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

(iv) reconstruction after natural or manmade disaster;

(v) for special development problems, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;

(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.

c. [107] is appropriate effort placed on use of appropriate technology? (relatively smaller, cost-saving, labor using technologies that are generally

c. [107] Under project, use of animal traction will be developing in conjunction with locally-produced implements.

most appropriate for the small farms, small businesses, and small incomes of the poor).	Appropriate technology will be basis of minimum - input packages aimed at increasing production on 1-5 hectare farms.
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)?	d. Project is a multilateral one and, as such, section 110 (a) not applicable. HB3, appendix 3D.
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"?	e. Grant capital assistance will be disbursed over the first three years of the project.
f. FAA Sec. 281 (b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.	f. Somali staff will be employed in all phases of project management and implementation. Skills will be developed in both-on-the job and overseas training.
g. FAA Sec. 122 (b). Does the activity give reasonable promise of contributing to the development of economic self-sustaining economic growth?	g. Yes, self-sufficiency in grain production the primary goal, will allow for development of other industries.

ACTION COPY

Annex III

Action taken: N/A

No action necessary: ✓

(Initials) (Date)

STATE ZZZ 242418

NNNNVZ PSB881BRA188
PP RUQMDI
DE RUESC #2418/01 2586344
ZNR UUUUU ZZH
P 150015Z SEP 79
FM SECSTATE WASHDC
TO AMEMBASSY MOGADISHU PRIORITY 5772
BT
UNCLAS SECTION 01 OF 02 STATE 242418/01:

AIDAC

E.O. 12065: N/A

TAGS:

ACT: AID
INFO: CHARGE
R.B.
G.J.N.

	INFO	ACTION
DIR		
D.DIR		
CONT	PVP	
PROG	RFS	
PR. DES.		G.J.
AGR.		
HEALTH		
MGT.		

SUBJ: PID APPROVAL: BAY REGION DEVELOPMENT PROJECT:

1. SUBJECT PID SUCCESSFULLY REVIEWED AND APPROVED 2 AUGUST. NELSON'S PRESENCE AIDED SIGNIFICANTLY IN CLARIFYING DONOR RELATIONSHIPS AND ROLES IN IMPLEMENTATION OF PROJECT. COMMITTEE CONCURRED IN MISSION REQUEST FOR SOCIOLOGIST FOR SIX/EIGHT WEEKS TO ASSIST IN DEVELOPMENT OF PROJECT AND ALSO RECOMMENDED PARTICIPATION OF AGRICULTURAL DEVELOPMENT OFFICER WITH EXPERTISE IN EXTENSION TO CONCENTRATE ON PLANNING OF REGIONAL EXTENSION EFFORT.

2. THE COMMITTEE GENERALLY AGREED WITH THE OVERALL CONCEPT AND MANNER OF CARRYING OUT THE PROJECT, BUT WISHED TO HAVE THE PP ADDRESS THE FOLLOWING TS:

A. THE PROJECT PURPOSE NEEDS TO BE FOCUSED TO IDENTIFY JUST WHAT THE PROJECT WILL PRODUCE.

B. SINCE SEVERAL AGENCIES AND MINISTERIES ARE INVOLVED IN IMPLEMENTING PROJECT ACTIVITIES, AN INSTITIONAL ANALYSIS OF THE REGION NEEDS TO BE INCLUDED IDENTIFYING THE ROLE OF EACH INSTITUTION AND HOW EACH WILL BE BACKSTOPPED BY THEIR PARENT AGENCIES. WHAT AUTHORITY WILL THE REGIONAL COORDINATOR HAVE OVER THESE VARIOUS ENTITIES AND WHAT ASURANCESEXIST THAT HIS/HER ROLE WILL NOT BE UNDERMINED BY CONFLICTING INTERESTS OF INDIVIDUAL MINISTRIES AND OTHER DONORS? HOW WILL THE LINKAGES WITHIN THE REGION BE ESTABLISHED TO DISCOURAGE DIVERSION OF PERSONNEL TO OTHER REGIONAL PROJECTS? SPECIFY THE STRENGTHS AND GOALS OF EACH ENTITY AND THE WAYS LINKAGES WILL BE ESTABLISHED TO MUTUALLY SUPPORT REGIONAL ACTIVITIES.

C. IT IS RECOGNIZED THAT THE AGRICULTURE DELIVERY SYSTEMS

PROJECT (649-?112) WILL ASSIST IN DEVELOPING A NATIONAL RESEARCH STRATEGY AND THE COMMITTEE SUPPORTS THE FEEDBACK MECHANISM FROM EXTENSION ACTIVITIES TO IDENTIFY RESEARCH AREAS FOR FURTHER INVESTIGATION. HOWEVER, CONCERN WAS EXPRESSED THAT THE RESEARCH WOULD NOT BE EXPANDED TO TEST RECENT TECHNOLOGICAL ADVANCES WHICH HAVE NOT BEEN INTRODUCED INTO THE SOMALIA CONTEXT. ADAPTIVE RESEARCH SHOULD BE EXPANDED BEYOND THE PROVEN TECHNOLOGICAL PACKAGE INTRODUCED BY WYOMING AND THE PP SHOULD SPECIFY THE EXTENSION/RESEARCH MIX THE BAY REGION PROJECT EXPECTS TO UNDERTAKE.

D. THE COMMITTEE WAS CONCERNED ABOUT THE TSETSE FLY COMPONENT OUTLINED IN THE PID. THE CURRENT STATE OF THE ART REGARDING STERILE MALE TSETSE FLY IS UNDERGOING EVALUATION AND IT IS FELT THIS TECHNOLOGY STILL NEEDS FURTHER REFINEMENT TO BE MORE EFFICIENT, COST EFFECTIVE, AND APPLICABLE TO VARIOUS STRAINS OF TSETSE FLIES. RANGE MANAGEMENT TECHNOLOGIES CAN BE INTRODUCED TO CONTROL GRAZING PRACTICES WHICH IN THE ABSENCE OF A PROVEN TSETSE FLY ERADICATION TECHNOLOGY CAN ASSIST IN THE CONTROL OF THE PEST. THE COMMITTEE RECOMMENDED THAT A STERILE MALE TSETSE FLY COMPONENT NOT BE INCLUDED IN THIS PROJECT AND SUGGESTED THAT THE DS BUREAU CONSIDER THE SOMALIA INTERRIVERINE REGION AS A POSSIBLE SITE FOR FURTHER TESTING AND DEVELOPMENT OF STERILE MALE TECHNOLOGY.

E. COMMITTEE RECOMMENDED THAT CONSIDERATION BE GIVEN TO EXPANDING UTILIZATION OF SHORT TERM TECHNICAL ASSISTANCE PERSONNEL IN LIEU OF FIELDING LARGE GROUP OF PERMANENT STAFF. PROJECT DESIGNERS SHOULD CONSIDER WHETHER FEASIBLE EFFECTIVELY IMPLEMENT PROJECT WITH SMALL CORE GROUP OF PERMANENT STAFF AUGMENTED BY CONSULTANT SERVICES SCHEDULED FOR SEVERAL TIMES A YR IN SIX WEEK/TWO MONTH OR MORE VISITS OVER LIFE OF PROJECT. THIS APPROACH WOULD PERHAPS ALLOW OBTAINING GREATER MIX OF TECHNICAL SKILLS ON A CONTINUING BASIS WHICH OTHERWISE MIGHT NOT BE POSSIBLE.

F. PP SHOULD EXPLICITLY IDENTIFY OTHER DONOR PROJECT COMPONENTS AND WHERE RESOURCES AND EFFORTS WILL BE DIRECTED WITHIN FRAMEWORK OF GREATER BAY REGION PROJECT. RELATIONSHIPS TO ON-GOING AID AND BANK PROJECTS IN THE REGION SHOULD BE CLARIFIED AND AREAS OF COMPLEMENTARITY EXPRESSLY CITED.

G. CONCERN HAS BEEN EXPRESSED ABOUT THE USE OF FURADAN IN THE ADAPTIVE RESEARCH COMPONENT AND ITS SUBSEQUENT EVALUATION AS MENTIONED IN THE IEE. SINCE THE EPA HAS PROPOSED THAT ALL FURADAN GRANULE FORMULATIONS OF 2 PER

CENT AND OVER BE CLASSIFIED FOR RESTRICTED USE IN THE U.S., A TRAINING COMPONENT MUST BE ADDED TO ASSURE INSTRUCTION IN THE PROPER USE AND HANDLING OF THE PESTICIDE BY USERS. NO PESTICIDE, REGARDLESS OF THE CONCENTRATION OF ACTIVE INGREDIENT, SHOULD BE HANDLED WITH BARE HANDS. ANY REFERENCES TO SUCH A PROCEDURE WILL BE DELETED FROM THE PID. AT THIS TIME A NEGATIVE DETERMINATION ON THE IEE IS ACCEPTED, SUBJECT TO THE INCLUSION OF ATRAINING COMPONENT IN THE PP TO INSTRUCT IN THE PROPER USE AND APPLICATION OF FURADAN, DELETION OF HANDLING PROCEDURES IN THE IEE, AND THE PREPARATION OF AN ENVIRONMENTAL ASSESSMENT AT A LATER DATE ON THE PROPOSED PESTICIDE USE. IN THE EVENT OTHER PESTICIDES

[illegible] ZES002BRA101
PP RUOMDI
DE RUEHC #2416/02 2580345
ZNR UUUUU ZZH
P 150013Z SEP 79
FM SECSTATE WASHDC
TO AMEMBASSY MOGADISHU PRIORITY 5773
BT
UNCLAS FINAL SECTION OF 02 STATE 242416/02

AIDAC

ARE IDENTIFIED DURING THE DEVELOPMENT OF THE PP, THE PROCEDURES OUTLINED IN THE ENVIRONMENTAL PROCEDURES, RULE 16, AS AMENDED, PARAGRAPH 216.3(B)(1)(I)-(IV) WILL BE FOLLOWED WHEN THE SPECIFIC PESTICIDES ARE IDENTIFIED AND BEFORE PROCUREMENT OR USE IS AUTHORIZED. VANCE
BT
#2416

Annex IV

INITIAL ENVIRONMENTAL EXAMINATION

Project Location:	Somalia
Project Title:	Bay Region Development
Project Number:	649-0113
Funding:	FY 80 & 81 $5,724,000
Life of Project:	6 Years - $11,171,000
IEE Prepared by:	Gary Nelson, USAID/Somalia, 9 May 1979 — Revised SAFEE, USAID/Somalia, April 12, 1980

Environmental Action Recommended:

Negative Determination pg. 3

Concurrence:

Charles P. Campbell 4/28/80

Mr. Charles P. Campbell
Mission Director

_____
Date

Assistant Administrator's Decision:

I. EXAMINATION OF THE NATURE, SCOPE AND MAGNITUDE OF ENVIRONMENTAL IMPACT

A. Description of Project - AID Components

The A.I.D. contribution to the project is primarily in the area of Agricultural Intensification. It will expand and broaden the extension program under the A.I.D. Project 649-0101 and develop an integraded, decentralized approach to Agricultural Development in the Bay Region.

The "minimum technology" approach begun under Project 0101 will be continued, concentrating on minor changes to current cultural practices in the extension program. The proposed project will expand the scope to incorporate livestock and animal husbandry programs in addition to crops.

A.I.D. will also be supporting an extensive training program both for in country and participant training. The core training will be provided to extension workers under the Agricultural Development System, Project 649-0112, and the proposed project incorporates on-the-job training of extension agents and short courses for farmers themselves.

The proposed project also includes an adaptive research component which tests appropriate technologies for their suitability and application in the extension program. This research program will review cultural practices, varieties and chemicals as to their safety factors prior to their utilization.

B. Identification and Evaluation of Environmental Impacts

1. Land Use

It is projected under the Project that there will be an increase in cultivated hectares due to the introduction of animal traction and substitution of capital for labor. However, current estimates are that less tha 5% of the cultivable soils are now cultivated. Even in the Bay Region, which is the primary agricultural region, there are vast amounts of excellent land which are not now and have never been cultivated. The rationale for incorporating livestock and agriculture in the Project was to permit a unified farming systems approach utilizing proper land use planning techniques. Thus, the project does not envisage random exploitation of the biomass resource.

Pesticides:
Although the use of sprays is precluded by high winds and general unavailability of water, Furadan as a seed preservative, applied at the time of planting in granular form, has been tested at Afgoi and proven effective. Permission to use furadan under Project 649-0101 has been requested (Memo 3/9/80).

Two training courses for Extension agents conducted at Bonka in the last year by the USDA/PASA Plant Protection Specialist have concentrated on safe application methods. Protective clothing, goggles and gloves are on order for Project 649-0101. In addition a portion of the training of extension agents under Project 0112 is training in the use and application of pesticides. Courses given to farmers at Farmer Training Centers will include training on the proper use of pesticides although it is envisaged that nearly all insecticide/pesticide application will be done by extension agents trained as applicators and following recommendations developed by the adaptive research component.

2. Water Quality: Wells to be drilled in the Bay Region will be preceded by studies on water resources under the Ground Water Project (649-0104). The effects of this Project on water quality will be minimal. In a low technology program we do not plan to use massive chemical treatments (fertilizers, insecticides etc.) and thus will not have contamination of either groundwater or surface water by runoff or leaching.

There is a possibility for some additional sedimentation due to clearing of additional lands but in flat lands such as those found in the project area this will not be a significant problem.

3. Atmospheric:
With a low technology program advanced mechanization is not foreseen. Therefore air pollution from machinery exhaust will not be significant. Wind velocities in the area are not high enough to cause serious wind erosion and dust problems on the heavy soils found in the area.

4. Natural Resources

As stated earlier land use planning both on a regional and on an individual farm basis is incorporated in the project. This will foreclose irrational use of the land resource.

The Project will be closely tied to National Range Policy.

5. Cultural and the T.A. Component includes a Range Advisor to ensure that range and crop lands are in compliance with sound ecological practices. The National Range Agency has been vested with the responsibility to oversee the siting of wells after investigating the environmental effects.

There may be a minimal dilution of cultural traditions as the farmers move from subsistence farming to the market economy. However, preliminary social analysis and experience under the Project 0101 indicate that the farmers are ready adaptors and since this project encourages continuation of present practices with minor changes no undue stress is foreseen.

6. Socio-Economic

There will be a shift to increasing involvement in the market economy as a result of the project. This is regarded as a positive benefit. The farmers will be participating by choice and the cost of the technologies being considered are low enough to not exclude any individuals.

7. Health

The agricultural program of diversification to oil seed crops will have positive effects on nutrition and thus health. AID project 649-0102, Rural Health Delivery Services, is active in the Bay Region and will complement the Agricultural Program with health education and health service outreach. The water analysis laboratory to be established under the Groundwater Project will ensure that Bay Region wells will supply potable water.

II. Recommendation for Environmental Action

The project will not have a significant adverse effect on the environment and therefore a negative determination is appropriate.

The essential nature of a minimum technology approach as is utilized in the project eliminates consideration of extensive use of agricultural chemicals or advanced mechanization.

Training is an important component of this project and related AID funded projects and this training will include both personal and ecological safety training. Land use planning is an integral part of the project in the consideration of farming systems in order to maximaze proper use of the total biomass. For these reasons we recommend a negative determination.

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Areas and Sub-areas 1/	Impact Identification and Evaluation 2/
A. LAND USE	
1. Changing the character of the land through:	
a. Increasing the population	M
b. Extracting natural resources	N
c. Land clearing	M
d. Changing soil character	L
2. Altering natural defenses	L
3. Foreclosing important uses	L
4. Jeopardizing man or his works	L
5. Other factors	
B. WATER QUALITY	
1. Physical state of water	N
2. Chemical and biological states	L
3. Ecological balance	L-M *
4. Other factors	
* Water Resource Survey and aquifer testing	
during, Yr. 1 (1980) of Groundwater Project.	

1/ See Explanatory Notes for this form.

2/ Use the following symbols:
N - No environmental impact
L - Little environmental impact
M - Moderate environmental impact
H - High environmental impact
U - Unknown environmental impact

C. ATMOSPHERIC

1. Air additives ——— L
2. Air pollution ——— L
3. Noise pollution ——— L
4. Other factors

D. NATURAL RESOURCES

1. Diversion, altered use of water ——— L
2. Irreversible, inefficient commitments ——— L
3. Other factors

E. CULTURAL

1. Altering physical symbols ——— N
2. Dilution of cultural traditions ——— L
3. Other factors

F. SOCIOECONOMIC

1. Changes in economic/employment patterns ——— M
2. Changes in population ——— L
3. Changes in cultural patterns ——— L
4. Other factors

G. HEALTH

1. Changing a natural environment ——— L
2. Eliminating an ecosystem element ——— N
3. Other factors

——— ———

——— ———

H. GENERAL

1. International impacts ——— N
2. Controversial impacts ——— N
3. Larger program impacts ——— N
4. Other factors

——— ———

——— ———

I. OTHER POSSIBLE IMPACTS (not listed above)

——— ———

——— ———

——— ———

See attached Discussion of Impacts.

Annex V

JAMHUURIYADDA DIMOQRAADIGA SOOMAALIYA
MINISTRY OF AGRICULTURE

Lam. _____ Waxna ku xiran _____

Jawaabta warq. L. _____

oo WB/WX/80-0018

Ujeeddo:

Mr. Charles P. Campbell
Mission Director
USAID/Somalia

CC: Ministry of Finance
Mogadishu

CC: State Planning Commission
Mogadishu

Dear Mr. Campbell:

We are happy to have USAID's participation in the Multidonor Bay Region Project. As you know, the Government of the Democratic Republic of Somalia has placed the highest priority on increasing food production to meet domestic needs and thereby reduce imported grain requirements. We feel that the Bay Region Project, which aims to assist small farmers in the Bay Region to increase their production of sorghum and other dryland crops and livestock, will make a substantial contribution toward our goal of self-sufficiency in food production.

USAID's contribution of $ 11,174,000 to finance technical assistance, commodities, and to train Bay Region staff is particularly important to ensure the continuity of the production increases long after the life of the project.

USAID's contribution will compliment the provision of the necessary infra structure, management staff and equipment provided by the IDA, IFAD, and OPF. The Government of the Democratic Republic of Somalia's contribution of 35.4 million Somalia Shillings ($ 5.6 million) will be applied to the local costs of the project.

This note is to place on record our appreciation for the participation of USAID in the above mentioned project.

Sincerely Yours,

Mohammed Abdi Noor
VICE MINISTER.

Project Authorization and Request for Allotment of Funds

Part II.

Name of Country: Somalia

Name of Project: Bay Region Development

Number of Project: 649-0113

Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize a Grant to the Somali Democratic Republic (the "cooperating country") of not to exceed five million and sixty-six thousand United States dollars (US$5,066,000) (the "authorized amount") to assist in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph:

The project consists of a program to increase agricultural production in the Bay Region of Somalia through the provision of infrastructure, technical assistance and training and commodities. AID's contribution to the multi-donor (IFAD, IDA, and ADF) project consists of providing technical assistance, training and commodities for the agricultural intensification system, the seed farm, the range component, the animal health component, and equipment for wells drilled in the Bay Region. To achieve the purpose of increasing agricultural production, the project unites the efforts of eight ministries and departments of the GSDR under a Project Management Unit.

I approve the total level of AID appropriated funding planned for this project of not to exceed eleven million one hundred and seventy one thousand United States dollars (US$11,171,000) during the period FY 1980 to FY 1985, including the amount authorized above and additional increments of grant funding during that period, subject to the availability of funds and in accordance with AID allotment figures.

I hereby authorize the initiation of negotiations and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Source and Origin of Goods and Services

Except for Ocean Shipping, goods and services financed by A.I.D. under the project shall have their source and origin in the cooperating Country or in the United States or in countries included in A.I.D. Geographic Code 941, except as A.I.D. may otherwise agree in writing. Ocean Shipping financed under the Grant shall be procured in the United States or in the Cooperating Country, except as A.I.D. may otherwise agree in writing.

b. Conditions Precedent

The Project Agreement shall contain a condition precedent providing in substance that prior to the first disbursement of funds under the Project, or to the issuance of any commitment documents with respect thereto, the Cooperating Country shall furnish in form and substance satisfactory to A.I.D. evidence that:

1) Letters of Agreement exchanged between the PMU and Ministry of Livestock, Ministry of Agriculture, National Range Agency, Ministry of Public Works, and Water Development Agency defining the role each is to play in the project and outlining the contributions in kind from each organization.

2) The 200 hectare seed farm has been allocated to the project.

3) Office workers, laborers, and other supporting staff are under the direction of the Project Management Unit.

4) Sites at Bonka, Baidoa, Mogadishu, and four districts have been allocated to the project for construction of housing and offices.

c. Covenants

The Project Agreement shall contain covenants providing in substance as follows:

1) The Cooperating Country agrees to appoint the required Somali staff in time to meet the training and operational needs of the project.

2) The Cooperating Country agrees to recruit for the project international staff for the Project Management Unit with qualifications and experience satisfactory to A.I.D.

d. Waivers

1) Vehicle Standardization Waiver, State telex No. 251368.

2) A waiver is hereby requested for the expansion of the shelf Item Rule to allow items available off the shelf in Kenya to be treated as if they were local shelf items.

ANNEX VII

AGRICULTURAL EXTENSION

Present Capabilities

The Somali Ministry of Agriculture was formed in 1959 in the former Trust Colony of Somalia. U.S. support and technical assistance began in 1958 and was directed toward hide and skin improvement, livestock improvement, credit and extension. These early extension efforts were not very successful because of the lack of basic information on agricultural practices in the country, different modes and customs of the people and an inability to adapt technology to the stage of development existing in Somalia.

The present day National Extension Service (NES) had its real beginning in 1965 with the arrival of a Wyoming University team contracted by USAID to improve agricultural extension in Somalia. After the arrival of the Wyoming team, considerable progress was made in adaptive research, extension, and training. Their main base of operations was the Extension, Training, Research, and Demonstration Center at Bonka near Baidoa. Over the next five years from 1965 to 1970, the Wyoming team, which over the term of the contract used 19 full-time personnel, six consultants and six survey teams made an intensive research, demonstration, and training effort that included :

1. Training of Extension Workers both in service and pre-service in agricultural extension techniques at the center. In addition, overseas training was provided for 25 participants. Eleven key personnel received degree training and 14 shorter term non-academic training.

2. Short courses for training approximately 900 farmers and farm leaders.

3. The preparation of demonstrations, on and off the station, with field days to show and tell trainees and farmers. Visits to the center was an important part of the program.

4. Showing films in different communities demonstrating the value of improved practices.

5. Demonstration of seed treatment, insect control, weed control, improved tillage and seeding practices and other adapted technology.

6. The distribution of improved varieties of seed selected from a large number of variety tests at the center.

7. The distribution of eggs and roosters, from an improved flock at the center, to farmers for upgrading their flocks.

8. Demonstrations of grain drying and storage techniques.

9. Training oxen and demonstrating the use of animal-drawn farm equipment.

10. Preparing brochures and bulletins on research fundings.

11. Meeting and discussing policies for the guidance of Extension Officials.

There were reports that the work at the centers became widely known in the Bay Region and was viewed by farmers in the area as a good place to receive information concerning improved methods of producing crops and poultry also that the farmer training and extension effort was just beginning to show signs of acceptance in a limited area when the Wyoming team departed from Somalia in 1970.

In the years following the departure of the Wyoming team, Extension in the Bay Region became stalemated or retrogressed. This can probably be attributed to GSDR policy shifts away from the small farmer subsector which led to:

(1) Incomplete and insufficient on-the-job training and exercise of decision making responsibilities by personnel working with the Wyoming team who estimated five more years would be required to prepare their counterparts to assume full responsibility for Extension.

(2) The departure from the Bay Region of most of the key personnel who were trained for leadership roles, at present only two of these trained overseas remain in that area.

(3) The selection of many new MOA employees in key positions at the National level on the basis of political considerations rather than technical competence with the result that most administrative personnel were not trained to implement field programs or make specific plans for agricultural development.

(4) Except for a few high level personnel who are well trained and competent, the Extension personnel in the headquarters and regional offices are a mixture of university and secondary school graduates who have had little, if any practical experience in agriculture and only very general training in agriculture; for example, secondary school students only receive three hours of training in agriculture out of a total of 36 hours of instruction given them in a week and the training given university graduates is largely theoretical.

(5) A lack of direction and inadequate logistic, administrative and financial support from headquarters.

The revitalization of the extension service is the most critical of components of the delivery system. The NES is the institution responsible for direct interaction with farmers and thus is the primary agent of change in the system. It is essential that the NES be made functional if there is to be progress in increasing productivity among small farmers.

In a culture such as found in Somalia with a strong oral tradition and only a recently introduced literacy, the only effective means to reach farmers is a direct person-to-person approach. The person-to-person approach requires intensive application of Somalia's scarcest resource, trained manpower. Therefore, a pyramidal structure has been designed which provides for small numbers of highly trained staff supervising and assisting a large number of less well trained agents with constant and continual retraining and follow-up.

The key to making this system effective is proper training at all levels directed at instilling the concept of a practical demonstration oriented "hands on" approach to taking the message to farmers. The project supports several units at different levels to accomplish the required training. It also provides the technical assistance necessary to develop and implement the supervision, follow up and referal system required when less than perfectly trained staff are used as field agents.

Training of Extension Personnel

Effectiveness of extension efforts depends on the quality of know-how and technical competence of the extension personnel at various levels. It would, therefore, be necessary to back up the extension program with a continuous process of training at various levels to progressively upgrade the technical skills of the personnel and keep them abreast of new developments. A comprehensive integrated training program would thus be an essential ingredient of the overall extension effort. The program would start with a two-year pre-service training in basic practical agriculture for Regional and District level supervisory officers at the FMETC and for field level extension agents at the ETCs. The training process would continue through in-service refresher courses from time to time and periodic on-the-job training at regular monthly intervals for supervisory staff and bi-weekly intervals for field agents. The in-service and on-the-job training would provide specific training in regard to practices of immediate relevance to be extended to farmers at a given period of time and would be the basic source of strength for the system. Overseas training at the graduate level followed by on-the-job experience would be provided for counterparts of internationally recruited staff to enable them to take over full responsibility for the Extension Service towards the end of the project period.

Periodic On-the-job Training

Field-Level extension agents

The proposed intensive extension approach relies for its impact, basically, on the regular visit by the FEA to each of 8 farmer groups in his/her circle at fixed time and day every week. The FEA is technically equipped for these visits through a continuous process of training every two weeks. The entire system is geared to this rigid schedule. Each two weeks on a fixed day, the FEAs along with their supervisors the DEOs would be given practical training by the REO and his/her assistants, the Crop Production and Plant Protection Specialists. The training would be concentrated on the few specific recommendations relevant to farming operations likely to take place in the following two weeks. This makes training timely, relevant and meaningful. The periodic on-the-job training is the most critical of the training programs, and efforts would be concentrated on making it effective. The training would be practically oriented, giving all opportunity to the trainees for practical work with their hands so that they would have full confidence in passing the recommendations to the farmers. A mimeographed lesson, listing the recommendations to be followed in the coming two weeks in clear specific terms along with other literature and audio-visual aids would be given to the trainees. At these sessions the FEA would have the opportunity to raise and discuss problems brought up by farmers during his/her visits to the fields. The training sessions would be limited to groups of about 30 FEAs along with the concerned DEOs. Staff from the research station and ETCs would participate.

The bi-weekly training sessions for the extension agents also provide an opportunity to ensure coordination between the extension service and input supply agencies and, ultimately, credit and marketing agencies. The FEAs would be able to assist the concerned agencies in a realistic assessment of requirements for inputs and credit in their areas, based on recommendations being made by them and their likely acceptance by the farmers. Effective coordination with the concerned agencies would be ensured by inviting their local representatives to the bi-weekly training sessions for about one hour as and when needed.

Regional Officers

Periodic on-the-job training would be given on similar lines to all the regional officers including the Regional Extension Officer and the Crop Production and Plant Protection Specialists by the headquarters staff and research scientists for a period of two days at the beginning of each month. The training would be conducted under the personal supervision of the Technical Director of the National Extension Service. Besides technical training, it would provide for planning and general review of progress of the extension program. The aim would be to build a high level of technical competence in the regional officers so that they may work with confidence as trainers for the field staff. The training would be held at the FMETC and would use the facilities at the FMETC training farm and the Central Research Station as needed. It would be practical and concentrate only on recommendations of immediate relevance. Scientists from the Research Station and teaching staff from the Agricultural Faculty and from the FMETC along with the Communication Specialist would participate. Headquarters specialists would prepare the lessons for each training session in close consultation with the research scientists. The training received at these sessions would be transmitted down the line to the field workers at the bi-weekly field level training sessions in the regions.

Other On-the-job Training

Seasonal Training

In addition to the periodic training at the regional level and at headquarters, comprehensive training sessions would also be held at each level at the beginning of each season. The training would last 2-3 days, and would provide the concerned trainees with an overview of recommendations concerning the various crops for the whole season, thus enabling them to better understand the logic behind the training given in the periodic training sessions. The seasonal training sessions would emphasize the overall extension goals and priorities. Experts from the Central and regional research stations and instructors from the FMETC/ETCs would participate in the training.

Orientation Training

As the extension system is introduced in anew areas, it is important that the concerned staff thoroughly understand the proposed approach to extension and the ways to make their effort effective. Such training would give the concerned personnel confidence in dealing with farmers, and lend momentum to the program right from the start. The training should cover 3-4 days. Trainers would be headquarters staff as well as field staff drawn from areas where the program has already been introduced. Training would be based on actual field experience.

Institutional Training

Pre-service Training - FEAs

About 368 FEAs would be required over a period of 7 years for making the Extension Service operational nationally at the field level. Around 310 of them would be trained under Project 0112. Potential FEA candidates would be recruited among people having finished intermediate level schooling. These would be given thorough training in practical agriculture. The ETC at Bonka (rainfed agriculture), would be reorganized and strengthened for imparting this training. The course would cover a period of two years and provide for training in three steps. The first step covering 6 months would provide classroom grounding in agriculture along with practical work on the training farm at each of the ETC. This would be followed by 14 months training on the job through two cropping seasons, both "Gu" and "Der". The trainees thus matured from exposure to the field would be brought back to the classroom for three months for a roundup course and examinations. The trainees would receive a certificate in Agriculture Extension upon completion of the course. While attending the ETC, the trainees would be required to undertake practical work with their hands for about two hours every morning, and would thus be fully involved in the growing of the crops at the training farm. Classroom training would at the same time ensure a grounding in the basics of agriculture. The course would include regular visits to research stations. The ETC and Bonka would be suitably equipped with staff and other facilities under Project 0112. Staff from regional research stations and regional extension service would be utilized as guest faculty.

Pre-service Training - Supervisory Staff

Supervisory staff required at district and regional levels as well as staff for the ETC would be found by deployment of promising existing staff to the extent possible and by recruitment of fresh faculty/secondary school graduates. The regional staff and principals

of ETCs would be faculty graduates while DEOs in the districts and instructors at ETC would be Agricultural Secondary School graduates. Both the existing staff and the fresh recruits would require exposure to practical agriculture and extension and management techniques. Training would be undertaken at the FMETC and would cover a period of two years. This training also would be in three stages to provide for a balanced mix of classwork and field work. The first 10 months would be utilized for classwork with practical work on the Training Farm at the FMETC. This would be followed by 11 months of supervised internship and two months of roundup and examinations. The trainees would be continuously exposed to research work at the Central Research Station. Research staff, staff from the Faculty of Agriculture and the Agricultural Secondary School along with the technical and communication specialists from the National Extension Service and the Farm Management Advisory Service, would be utilized as guest instructors.

Special Technical Training

The regional officers and instructors at the ETCs play a critical role in providing training and technical support to the field agents. Special attention would have to be given to upgrading their technical competence on a continuous basis to enable them to effectively guide the field agents. The specialist would receive one or two weeks intensive training at the beginning of each season in subjects related to their specialty. In addition, special courses ranging from one to several weeks duration would be organized at the FMETC to cover a variety of subjects and crops. Examples of such courses would be: improved plowing practices, better use of hand tools, use of ox/drawn implements, pest and disease control for different crops, etc.

In-Service Refresher Training

It would be necessary to bring the FEAs and DEOs to the ETCs for in-service refresher training for about one month every two years to ensure upgrading of their knowledge and skills, so that they are kept abreast of the latest technical developments. The course would include refresher training in extension techniques. Staff from research stations and regional extension offices would participate.

Extension Service

Delivery of technical information to farmers requires a large number of agents at the village level to work on a daily basis with farm families. The structure to be developed in the project is a classical pyramidal model with large numbers of minimally-trained agents supervised by a smaller number of better-trained district officers who are in turn supervised by a still smaller number of professionals at regional levels who are supported and supervised

by a small cadre of specialists and professionals at the central level. Beyond the government structure, experience has shown that the final spread in the pyramidal model is the spread from initial adaptors or innovative farm families to the remainder of farms. This structure is presented schematically in Table 2. This type of structure economizes on the scarcest resource, trained manpower, by limiting the number of highly trained staff which are required.

The crop production sub-sector, as it now exists, would need about 360 new Field Extension Agents (FEAs). Each FEA would serve about 500 families. This ratio of one FEA to 500 families takes into consideration the size and spread of cultivated holdings, the area an agent would have to cover, the present low level of technology on the average farm, and the level of technical competence that may be expected from an extension agent. This ratio is likely to improve as agriculture becomes more intensive and market oriented. FEAs would be supervised by District Extension Officers (DEOs) at the rate of one DEO per eight FEAs. This would enable each DEO to visit the area served by each of his FEAs once every two weeks at the rate of four touring days per week. He would check that the visits by FEAs were being carried out regularly and on schedule, and assist the FEAs and farmers in addressing technical matters. He would attend the training sessions with the regional subject matter specialists along with the FEAs. This type of work relationship between the FEAs and DEOs would obviate the need for formal reporting. FEAs would, however, be expected to maintain diaries of their activities which would be scrutinized and signed by the supervising DEO. The DEOs would find out whether the FEAs visits were being made as planned by making surprise visits and by asking farmers simple questions like the name of the FEA, the day fixed for his or her visits and whether his or her messages were being implemented in the fields. Once farmers had become aware of the FEA's visit schedule, they would themselves become effective supervisors.

The regional extension program would be headed by the Regional Extension Officer (REO) who would be assisted by two regional subject matter specialists, one for crop and on-farm animal production and one for plant protection. The subject matter specialists would provide on-the-job training for groups of DEOs and FEAs every two weeks, followed by technical guidance regarding their field work with farmers. The regional specialists would spend about one-third of their time briefing FEAs on the "message" to be delivered to farmers. Another third of their time would be spent on field visits with DEOs and FEAs, helping them solve specific technical problems and conducting and supervising crop trials and field demonstrations. The remainder of the specialists' time would be devoted to preparing the content of the "messages" and on visits to the local research station for an active, continuing,

first-hand contact with research. The REO would involve the research scientists and the instructors at the ETCs in planning and conducting the regional training program and in developing training materials. The REOs, DEOs and regional subject matter specialists would, in turn, be brought together at the FMETC for a period of two days at the beginning of each month, for intensive training by the Farming System and Plant Protection Specialists based at Headquarters. Here again, these specialists would maintain close contact with the Central Research Station through regular and frequent visits and discussions and through the active involvement of the research scientists and the FMETC staff in the formulation of the extension messages to be delivered to farmers.

The extension effort would concentrate on the few important crops and a limited number of easily understood tasks to be implemented during the two-week period between FEA briefing sessions. The message would focus on those practices likely to bring the best economic results, while making optimum use of the farmers' available resources. A number of sound research recommendations and common sense answers to failures in the farming system are presently available for use by the Extension Service. The initial thrust would be towards improving the husbandry practices such as field preparation, sowing, weeding, and plant protection. The main concern in the early stages would be to ensure an even plant population in the fields at harvest time, which by itself would result in a substantial increase in yields. Improved management practices would be stressed, rather than the use of purchased inputs. Initial messages would aim at the effective use of this labor. Since low productivity is often the result of inappropriate elementary husbandry practices, simple technological improvements could be introduced quickly at this stage without waiting for the results of an elaborate, time consuming screening and trial process. Improvements in productivity could be achieved even with the improved use of traditional hand tools by farmers. Once yields and incomes could be made to increase in this way, so would the farmers' confidence in the extension service, hence making them receptive to further and more sophisticated messages. The extension service could thus, without delay, obtain an initial reaction which would ensure its continued acceptance. Once convinced of their capability to increase production through improved practices with the help of extension workers, farmers would be willing to adopt the use of more sophisticated inputs such as pesticides, new seed and crop varieties, ox ploughs, fertilizers (where applicable) and other improvements which would be identified and developed by a strengthened national research service.

In order to diffuse the know-how obtained by them at the bi-weekly training sessions, the FEAs would follow a fixed schedule of visits to farmers, at a fixed time and day through four days every week. The "clients" of a given FEA would be divided into eight groups. The FEA

would visit two groups a day, one in the early morning and the other in the late morning. Evening sessions would be used for audio visual campaigns with programs developed by the NES and delivered by REO staff. He or she would attend the bi-weekly briefing sessions either at regional headquarters, or at the ETC on a fixed day, after having carried out two rounds of visits to farmers. The spare days would be used for make up visits and for solving problems encountered by farmers.

It would not be possible or necessary to attempt to reach all farmers directly through extension work in the field. The FEA would identify about six farmers (about 10%) from each group of 60-70 farmers to serve as his "contact farmers". Contact farmers would be drawn from all levels of village society, and would be selected in consultation with local people taking into account their potential influence and willingness to collaborate with the FEA. Contact farmers could be replaced between seasons if they proved to be ineffective or ceased to cooperate. During his field visits the FEA would make special efforts to visit all contact farmers' fields and encourage them to get in touch with other farmers. Their fields would be used for carrying out demonstrations and field trials.

Given the overall technical weakness of the existing staff, all extension personnel would go through two year pre-service training at the FMETC or at an ETC. In the case of the present NES staff who will assist with the initial start up of NES prior to the establishment of FMETC, they will be recycled through an FMETC short course as new FMETC staff replace them. In addition, a program of intensive on-the-job training would be established to build up the technical competence of the staff, step by step in periodic, small, easily digestible doses of know-how directly related to the particular stage of the production process prevailing at the time. The regional senior extension staff would provide this type of training for DEOs and FEAs at regional headquarters or at ETCs, in groups of 30 to 40, on fixed days, say Wednesdays or Thursdays, once every two weeks. The regional officers would, in turn, attend training sessions at the National Extension Service headquarters in Afgoi conducted by the Headquarters Crop Production and the Plant Protection Specialists under the supervision of the Director of the NES. These sessions would be held on the first and second day of each month.

Past Experiences

The AID project 0101 technical team has been working in the Bay Region for about one year. Their experiences with the outreach program are a base from which future programs can be built. The following is an extract from their evaluation of the first year's work.

An Educational Delivery System

One of the main goals of the GSDR is to establish a viable National Extension Service that can serve as an effective educational delivery system. It is assumed that such a system would facilitate the national goal of self sufficiency in food production. The Extension concept initiated in the United States in 1914 would suggest this notion as a viable assumption.

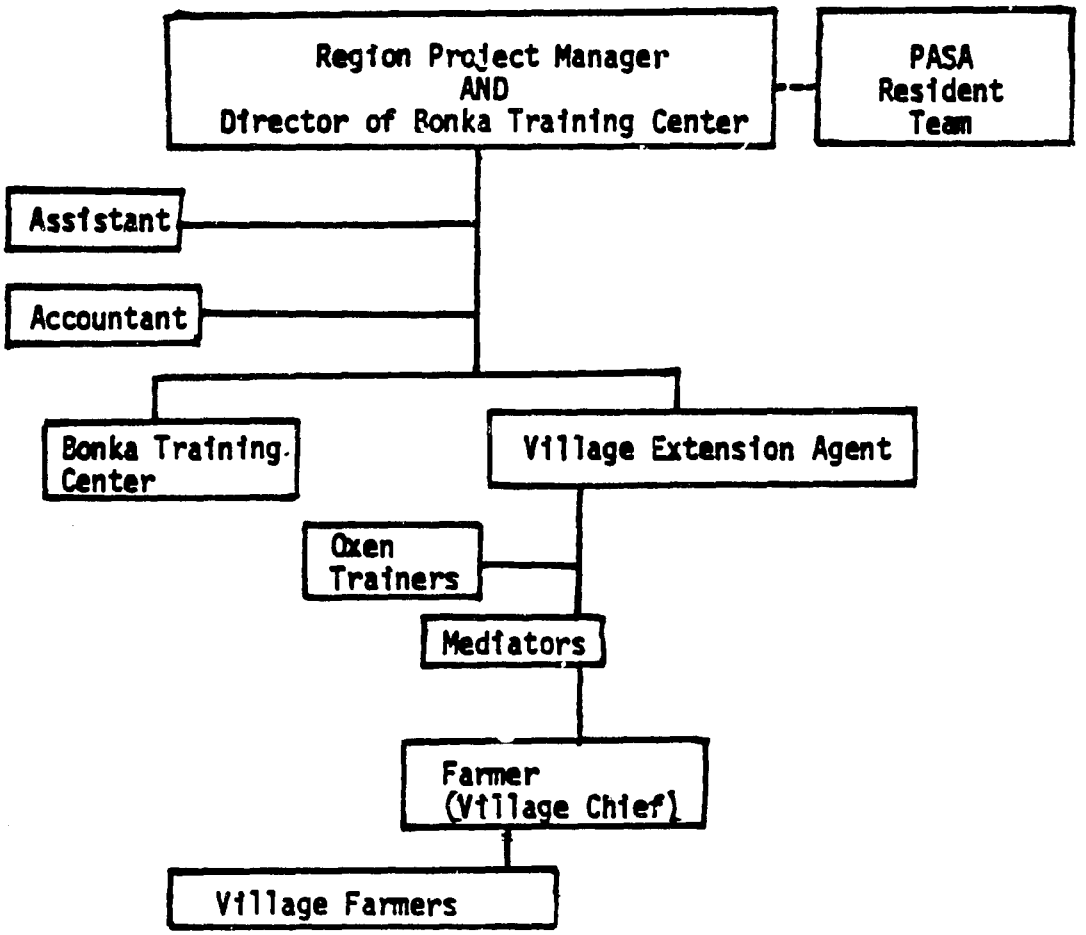
It must, however, be kept in mind that a viable National Extension Service must be created, not in isolation but in connection with many other supportive institutions. There must be a source of trained personnel, technical information, and public support. The Extension educational delivery system draws from these institutions and provides a communication linkage to serve the informational needs of the clientele.

Given that each of the above supportive systems are in the development stage, the project is perceived as being designed to facilitate the development of a model regional Extension system, drawing on both internal and external support during the development stages. The challenges to the field staff becomes one of foraging a viable Extension organizational structure, that is staffed with trained personnel and a structure that is capable of substaining itself in the long run.

Organizational Structure

The staffing pattern utilized by the GSDR in support of the project was reviewed. The following chart was drawn by a member of the local extension staff and is reproduced here.

THE BAY REGION



Basic Extension Concepts:

There are several basic Extension concepts that are considered useful for this project. When designing an extension educational system, they should become goals toward which one hopes to achieve. When utilizing these concepts one must keep in mind the cultural pattern, the resources available and the stage of development of the extension organization in the host country.

The following should not be considered as an all inclusive list but rather a listing of some of the basic Extension concepts:

A. Philosophy of Extension

1. Extension is an educational function, not a service-oriented function.

2. Extension staff work with people, not for people.

3. Extension helps people to help themselves.

B. Extension Program Concepts

1. Program planning - the process of working with local people in determining needs, goals and objectives and developing a plan of action.

2. Program implementation - the process of involving local people in carrying out the plan of action.

3. Program reporting - The process of summarizing the work accomplished and results achieved which can be used for educational purposes and to inform the supporting institutions.

4. Program evaluation - The process of judging the results achieved and using the information to strengthen an ongoing program.

C. Educational Teaching Methods and Techniques

1. The demonstrational - methods and result demonstration.

2. Visual aids.

3. Individual and group contracts.

4. Mass media.

5. Other appropriate teaching methods for the area.

The lack of formal plans or documents of the type mentioned in item four above should not be considered a problem at this time. When a team leader is added to the PASA staff, immediate attention should be devoted to developing a plan of action in concurrence with the Mission and the Ministry of Agriculture.

Recommendations

In order to facilitate this thrust of the project, the following recommendations are made:

1. An organizational chart should be developed and made available to all members involved in the project. Such a chart would facilitate communicating the thrust of the project, and would serve as a valuable teaching aid in training village extension agents.

2. A handbook for GSDR Extension personnel should be prepared if one is not already available. Such a document should contain all relevant information about the philosophy of the National Extension Service, the mission and objectives of the organization, operating policies, rules and regulations.

3. The efforts of the PASA team should be devoted entirely to the Bay Region where they can build an Extension Educational Delivery system and the other three components implied in the project. Extension agents located in other parts of the country that need training should be transported to the Bonka Training Center to participate in ary scheduled training being conducted for agents in the Bay Region. Such an arrangement would increase the efficiency of the PASA team members' time and effort.

4. The feasibility of rotating village Extension agents in and out of the Bay Region should be explored. Once a viable training program has been developed, agents could be assigned to the region for an appropriate period of time for on-the-job training. After completing a tour of duty, they could be assigned to other locations within the country.

5. Every effort should be made to strengthen the training capacity of the Bonka Training Center. The Center should be viewed as the supporting institution for the total project.

6. The capacity of the Bonka Training Center would be enhanced if the following activities were strengthened:

   a. The record keeping system. A system should be designed to facilitate the keeping of records of all activities. Such information would be highly valuable for planning, training and as a reference source. Examples of records and reports which should be kept are:

      - Reports of work accomplished.

      - Reports of demonstration results.

- Lesson plans used for training village Extension agents.
- Lesson plans used for conducting short courses and other training activities for village farmers.
- Plans of work prepared by village Extension agents.
- Any and all visuals prepared for training purposes.
- Other similar materials that would have reference value.

b. Translation capacity: Emphasis should be placed on strengthening the capacity of the Center to translate materials into the official language of the country.

Consideration should be given to placing a team of GSDR agricultural specialists at the Bonka Training Center that could provide support and training for village Extension Agents. These positions should be added during the last year of the project. At least the following positions should be considered:

1. An agronomist
2. Production livestock specialist
3. An entomologist

The use of mediators should be continued. It is believed that the mediators can make a real contribution to the achievement of the project and a viable National Extension Service. If their roles are properly defined and they are trained to perform their tasks they can make a real contribution. Replacements for any current position that become vacant should always be selected from the village in which they will be expected to work. Their main task or responsibility should be limited to teaching village farmers the skills needed to carry out practices recommended by the village Extension Agent. They should be assigned to work with a specific number of village farmers each growing season.

The overall goal of the project is to reach to farmers and the following recommendations are offered:

1. The list of technical recommendations and farming skills that will be taught to farmers should be continually refined. It will be useful to divide the list into at least three phases:

a. Phase I: This phase should represent the "minimum technology" and contain only those practices that could be implemented by the farmer without bringing in any additional resources of any type. Such a package might include the following:

   - Crop rotation
   - Use of animal manure for fertilizer
   - Stalk removal to reduce insect infestation
   - Other similar practices designed to conserve soil moisture, improve fertility and control insect damage.

b. Phase II: The utilization of limited outside resources of the type that could be obtained by the farmer with his own resources. Such practices in this phase might include:

   - Treating seed
   - Planting in rows
   - Use of simple plows
   - Other similar practices.

c. Phase III: This phase should be considered as the more advanced effort and it assumes the farmer has learned the importance of all the basic practices required. Additional outside resources can be made available in whatever amount he has the capacity to use.

2. Educational Nature of Extension: The long term objective of this project is to develop the production skills of the farmer. For this reason all training should emphasize the educational concept of Extension. It is very easy for people to assume that Extension provides services for people. While certain services may be provided, the educational nature of such should always be pointed out.

3. Technical training: The project should continue to use very simple visual illustrations containing one idea for training farmers.

4. Skill training: The project staff should continue teaching farmers at Bonka and in the field the basic skills required to implement production practices. Recommended examples are:

- How to collect and spread animal manure.
- How to select seeds.
- How to check for insect damage.
- How to mark off rows in the field.
- Other similar practices.

5. Teaching demonstrations: The field demonstrations should be continued and accelerated. To increase their effectiveness the following points should be considered when setting up a field demonstration:

a. The village farmers should be involved in the planting.

b. The village farmers should select the farmer to carry out the demonstration.

c. The demonstration should be of simple design.

d. The demonstration should show the advantages of one basic practice, not more than two.

e. The farmer should be able to compare the demonstration result again his own practices.

f. The Extension agent or mediator, or both, should arrange to teach the farmer the basic skills needed to carry out the demonstration.

g. The mediator or Extension agent should arrange to visit the demonstration and see that the farmer implements the planned practices on schedule and correctly.

h. All village farmers should be involved at harvest time to see the result.

The evaluation team offered the following summary: Based on observations and personal interviews with project participants, it is believed that the project is sound and has the capability of moving toward the goals specified. An "immediate impact" can be achieved provided all supportive institutions fulfill their obligations on a

scheduledbasis. There are indications that a level of increased food production can be achieved in the Bay Region. However, increases of any magnitude, beyond the current harvesting and/or storage capacity of the farmers will require additional inputs from supporting institutions.

There appears to be a high level of awareness in the area of the village Extension agent, the project and the efforts of the Ministry of Agriculture. There is evidence of a high level of acceptance on the part of the local people and farmers. This conclusion is supported by the fact that a chief of one of the largest villages in the area arranged to make a personal call at the residence of the writer to express appreciation for the project. Two other individuals also made such an effort.

It is highly possible that a number of the so-called traditional production practices used by farmers in the area may have a place in the minimum technology package to be developed. It would appear that the major problems affecting crop production in the area are water, insects, and the lack of available resources.

Given these findings, the project planners should give every effort to provide the required support to keep the project moving.

It is imperative that the PASA team view their role as trainers. In order to facilitate this perception, they must have personnel to train; otherwise, there will be a tendency for the team to actually perform certain tasks in an attempt to assure project success. While this response is desirable, it sets in motion certain patterns of operation which may be difficult to change at a later time.

This project is viewed as having four major thrusts which are interrelated and supportative. These are:

1. The designing and building of an Extension Educational Delivery System.

2. Providing training for the GSDR Extension Staff.

3. Assisting GSDR Extension Staff in planning and conducting training for farmers.

4. Packaging technical information that can be used to increase food production.

The evaluation of Project 0101 clearly indicates the need for supporting structures and institutions to complement their activities. The Agricultural Delivery Services Project (649-0112) provides the essential central level training and technical support required while the Bay Region project provides regional staffing, technical skills, seed production, upgrading Bonka center, etc., as well as the mechanism for integration of crops and livestock.

ANNEX VIII

AGRONOMIC ANALYSIS

BAY REGION DEVELOPMENT

A Review of Somali Crops

This review includes the principal crops grown under rainfed conditions at the Bonka Training and Research Center and in the Bay region. The Center has been the only station to deal solely with rainfed research and demonstrations during the past ten years.

Reports from the Wyoming experience at Bonka have reported the majority of the information concerning rainfed agriculture. Insect pests listed in this section were prepared in 1977 by the MUCIA entomolosit stationed at the Afgoi Research Center.

Detailed and descriptive reports dealing with rainfed research are meager. Rainfed experiments initiated at Afgoi in 1978 failed, in 1977 research results were largely inconclusive.

At Bonka, sorghum research was stressed in light of the importance of the crop in the region. Little is known about other crops. Only a few studies dealt with maize, sesame, groundnuts or other crops although a considerable amount of sorghum, groundnuts, field peas, sunflower and safflower seeds were produced and made available to the MOA for eventual distribution to farmers.

Grain sorghum is a popular, adapted crop in the Bay Region as evidenced by its widespread cultivation and the presence of mixed local and introduced types grown on an estimated 85 percent of the land. Maize is planted throughout the Region but yields are unreliable and predominantly low due to the limited and erratic rainfall pattern. Millet is a dependable crop in the area but farmers give the crop very little consideration.

Production of edible oil seeds is confined to sesame and groundnuts. Sesame acreage is estimated to be around 10 percent of the cultivated land, while groundnuts probably occupy less than 5 percent. Both crops are generally adapted in the Region.

Cowpeas are cultivated to a limited extent as a single crop, as well as intercropped with sorghum or corn. Mungbeans are also reported to be produced under rainfed conditions.

The past experience of the University of Wyoming demonstrates the opportunity sorghum offers to increase grain production in the immediate future.

Sorghum (Sorghum bicolor)

A mixture of sorghum types is produced on at least 95 percent of the farms in the Bay Region. The crop is the most important cereal and is planted in both the "Gu" and "Der" seasons. Average yield is around 350 Kg. per ha. and is produced without improved technical or market inputs by farmers utilizing hand labor in all farming operations.

The importance and value of selected varieties and improved rainfed farming techniques for increasing production were demonstrated by the University of Wyoming at Bonka from 1966 through 1969. Research and demonstrations undertaken included variety testing and selection of introduced and local types of sorghum, addition of animal manure, chemical fertilizers, green manure, alternate fallow effects, insecticide use, and the introduction of oxen drawn implements for land preparation and cultivation. Mechanized farming was also practiced using tractors, threshers and various types of seeding and cultivating equipment.

Variety Testing and Selection

During a two year period in which selections were made in local sorghum types, a local type used as the check produced 4.6 qq per ha. while the highest yielding selection produced 8.9 qq per ha. In the following year, the check yielded 10.6 qq per ha. and the best selection 14.8 qq per ha. The experiment indicated increased yields were provided

by selection for early maturity, shorter stalk length and higher yields.

In another experiment at Bonka in which varied varieties and a local check variety were yield tested for a period of six cropping seasons, overall average yields for the highest yielding variety was 11.3 qq per ha. compared to 7.9 qq per ha. for the local variety.

Value of Animal Manure

This demonstration consisted of an application of about 12,500 kg of animal manure per ha. applied before planting and mixed in the soil. A check plot of equal size was planted and treated equally except no manure was applied. The treated plot yielded about 30 qq per ha. versus 10.2 qq per ha. for the untreated plot. These figures represent an average yield over a period of six crop seasons.

Chemical Fertilizers

An application of 225 kg per ha. of 17-17-17 fertilizer was applied by drilling before planting sorghum. All plots were treated equally except for the check plot which received no fertilizer. The fertilized plot yielded 18 qq per ha. while the unfertilized plot yielded 12 qq per ha. These were average yields obtained for six crop seasons

Green Manure

Cowpeas were planted as a green manure crop during the "Gu" season. Vines were plowed under after the crop obtained maximum growth and the field was planted to sorghum during the "Dir" season. Over a period of six crop seasons, sorghum yields were increased by an average

of 33 percent over the check plot yields.

Alternate Fallow

This demonstration was established to determine the effect of alternate fallow on sorghum yields grown on land after being fallowed for one crop season. Results indicated alternate fallowing after sorghum had little effect on yields.

Fallowing farmlands on alternate years or seasons is widely practiced in the temperate zones regions with limited rainfall. Long term experiments in the U.S. have shown that not more than 30 percent of the rainfall occurring during the year of fallowing can be stored in the soil for the succeeding crop. Often as little as 10 percent was conserved. Evaporation losses, soil moisture utilization by weeds and runoff losses from bare soil are largely responsible for the limited soil moisture storage. Stubble mulching instead of bare fallow has proven to be a major improvement in storing moisture. However, there may be situations where the total crop production on a farm may be increased by omitting the fallow and producing a crop every year by choosing a suitable crop, correcting soil fertility deficiencies with appropriate fertilizers, by adequate weed control in the crops, and by modification of all cultural practices to capitalize on moisture conservation and use.

Insecticides

The following insecticide research has been reviewed:

1. The spotted stalk borer (Chilo partellas Swin.) has been

identified as a pest causing recurring and serious losses in sorghum in rainfed farming regions. The Wyoming group demonstrated control of the borer with one application of DDT when sorghum plants were 12 to 15 cm. in height. The treated plot averaged an increase of 40 percent in yields greater than the untreated plot.

More recent research was reported by the MUCIA entomologist in 1977 The pesticide "Furadan 10 G" (granular form) was applied with corn seed during planting on irrigated land. Good control of the borer through the entire growing season resulted when applying 3 kg. active ingredieny per ha. Furadan is effective through systemic action in the plant. This chemical should also give good results in controlling stalk borer infestation in sorghum.

The Sorghum Midge (Contarinia sorghicola Coq.) has been identified as an important sorghum pest which attacks the plant and prevents seed development. Other than the identification of the pest, little is known about it in Somalia.

The Sorghum Shoot Fly (Atherigoria varia socatta Rond.) often attacks sorghum in the early stages of crop growth. Control has been shown to be satisfactory with Furadan granules placed with the seed at time of planting.

The preceding insects listed are believed to be the most important pests capable of causing severe yield reduction in sorghum. Practically all insect identification and pesticide evaluation trials were conducted on the research station at Afgoi. Very little insect pest research has been conducted in rainfed areas.

In addition to the insects listed previously, the following insects have been identified as sorghum pests in Somalia;

1. American bollworm, Heliothis armigera(Hub)
2. Armyworm, Mythimna loreyi(Dup.)
3. Blue bugs, Calidea spp.
4. Bollworm, Pyroderces hemizopha(Meyr.)
5. Chafer grubs, Schizonycha, spp.
6. Dried fruit beetle, Carpophilus dimidiatus F.
7. Flea beetles, Epitrix spp.
8. Maize aphid, Rhopalosiphum maidis(Fitch)
9. Spider mite, Oligonychus simus(Pritch and Bader.)

Maize (Zea mays)

Maize is probably the most sensitive to drought of the warm season cereals. Sorghum and millet tolerate dry periods during the growing season to a much greater degree than maize and are generally more productive where rainfall is limited and erratic during the growing season.

Maize yield trials and demonstration plots were grown at the Bonka center from 1966 through 1969. At the end of the three year period, the conclusion was reached that when equally treated plots of sorghum and maize were planted under comparable conditions, maize would produce only about 50 percent as much grain as sorghum. The principal site for maize research is the Afgoi station where practically all experiments and production are under irrigation.

Insect Pests: Insects found to be pests in maize at Afgoi are

are listed below:

1. Armyworm, Mythimna loreyi (Dup.)
2. Angoumois grain moth, Sitotroga cerealella (Ol.)
3. Chafer grubs, Schizonycha spp.
4. Dried fruit beetle, Carpophilus dimidiatus (F.)
5. False codling moth, Crytophlebia leucotreta (Meyr)
6. Maize earworm, Heliothis armigera (Hub.)
7. Maize aphid, Rhopalosiphum maidis (Fitch)
8. Maize leafhopper, Cicadulina mubila (Navde.)
9. Rice weevil, Sitophilus oryzae (L.)
10. Stem borer. Sesamia cretica (Led.)
11. Spotted Stalk borer, Chilo partellus(Swim.)
12. Snout beetle. Tanymecus sparsus (Fhs.)
13. Termites, Macrotermes sp.
14. Wireworms, Elateridas

Groundnuts (Arachis hypogaea)

Groundnuts are believed to be grown more extensively than any legume in the rainfed region. In many areas groundnut acreage is increasing The Wyoming group planted groundnuts at the Bonka Center to demonstrate the value of a green manure crop in a crop rotation scheme and as a food crop. The Spanish type is grown by most farmers in the area and was one of the most satisfactory types under test at the Center. A new groundnut introduction called "Local Large"matured three to five days earlier than the Spanish type and averaged four kernels per pod. In demonstrations conducted at the center, the average yield of the Local Large was 930 kg. per ha. compared to 623 kg. per ha. for the Spanish

type. Irrigated groundnut research has been conducted at the Afgoi Research Station.

Groundnut Diseases: Cercospera leaf spot and a type of "rust" are the only diseases noted in published reports.

Non-Parasitic Disorders: Two disorders mentioned in research reports are nutrient imbalances related to phosphorus fixation in soils around Bonka and the occurrence of a general plant chlorosis occurring throughout the growing season.

Insect Pests: Groundnut pests identified at the Afgoi Research Center include:

1. American bollworm, Heliothis armigera (Hub.)
2. Chafer grubs, Schizonycha spp.
3. Cotton leafhoppers, Empoasca spp.
4. Groundnut aphid. Aphis craccivora (Koch.)
5. Systates weevils, Systates spp.

Termites and thrips were also noted.

Sesame (Sesamum indicum)

In the review of rainfed crop research and demonstration reports, no information was reported dealing with sesame production or research. Apparently many different types of sesame are indigenous to Somalia, however, the white, cream or buff colored seeds are preferred. All of the types grown have the "shattering" or dehiscent characteristic. Maturity varies from 70 to 100 days. There appears to be interest in obtaining "non-shattering" types. A commonly reported average sesame yield is 378 kg. per ha. This probably includes irrigated production

which showed a higher yield than was obtained in the rainfed regions.

Sesame is reported to be grown mainly in the "Dir" season as insect pests are fewer than in the "Gu" season.

Pests: Insect pests identified on sesame trials at the Afgoi Research Center included:

1. Sesame webworm, Antigastra catalaunalis (Dup.)
2. Epilachna beetle, Epilachna chrysomelina (F.)
3. Various mites and some borer species were also reported.

Oxen Power Experience

One of the Wyoming functions at Bonka was the training of oxen to be used in farming operations. Fifty two head were eventually trained at the Center.

Oxen are currently in use at the Center for pulling plows and cultivators. The implements in use are single moldboard plows and a 4-row cultivator using locally constructed frames and standards mounted with various types of sweeps. Yokes constructed of wood and animal control lines are made at the Center.

Camels have also been trained and used to pull plows and cultivators. Only one camel is used for this purpose instead of the two oxen usually used. However, two men work with a camel while only one is needed with oxen.

Principles and Practices for Crop Production

Research conducted and farming techniques used in other dryland farming regions of the world have resulted in an accumulation of many

principles and practices which may be directly applied to areas where research has not been extensively conducted. In addition, to these applications, the currently applied local technology often may be improved or modified to increase production. Practices described in this report apply to many crops grown under rainfed as well as most irrigated conditions in the Bay Region of Somalia.

Total rainfall and its distribution is the principal limiting factor in crop production in the Region. Farming practices should emphasize two objectives:

1. To conserve rainfall and

2. To apply practices and technology which will make more effective use of water stored in the soil.

It should be noted that substantial yield increases of any crop require the simultaneous application of all or much of the technology to be used in rainfed or irrigated agriculture. Each recommended practice in a farming system should make a satisfactory economic contribution or the practice is not likely to survive. Increases in productivity need to be substantial to provide sufficient incentive to be adopted by farmers. The individual farmer must see immediate benefits, and, also, become convinced that continued progress is feasible.

Timeliness of Farming Operations

In order to successfully apply principles and practices needed for increased crop yields, farm managers assume the crucial role in determining the effectiveness of any improved input in the farming system. And, timeliness of operations will be a key to the success of any system. Appropriate technological information cannot be fully beneficial to farmers until some plan can be presented in which the

proper sequence of cultural operations can be understood and demonstrated to be effective.

The Seed Farm

A critical constraint to production increases in the Bay Region has been the lack of well adapted, properly stored and selected seed. Under the Bay Region Project, the existing 200 hectare seed farm will be upgraded and supplied with seed processing equipment. USAID will provide a Seed Farm Manger under project 649-0101 for 15 years whose services will be continued for 4 years under the Bay Region project. Research currently being conducted by 649-0101 will supply base-line data to the seed farm manager so that selection of varieties can begin. Shortly after the manager's arrival, demonstration plots under project 649-0101 will have accumulated two seasons of production data and will provide a basis for seed selection in year one of the Bay Region Project.

Sorghum Seed Selection: Most farmers presently rely on their own production for a source of seed. The common seed threshing method entails beating sorghum heads with a wooden object in a receptical which serves to catch the threshed grain. This threshing process causes considerable grain damage in the form of cracked seed and broken seed. Threshing technology to reduce damage and increase seed viability will be developed at the seed farm.

Farmer acceptability and marketability of sorghum, sesame and pulse varieties will be surveyed continually. Extension agents will provide the link between farmers, the ADC and the seed farm. They will be charged with maintaining an information feed-back system and relating the acceptability and profitability of seed varieties.

As the program progresses and problems are identified in the selections, additional extensive collections can be made throughout the country and the international nurseries in order to expand the germplasm base.

Nurseries are available from the following international agricultural research organizations. In general orders must be placed far in advance to research organizations in order to receive them at an appropriate time.

The International Crops Research
Institute for the Semi-Arid Tropics (ICRISAT)
1-11-256 Begum Pet
Hyderabad 500-016
A.P. India

The International Institute for
Tropical Agriculture (IITA)
Ibadan, Nigeria

Institutions, in neighboring countries, the USDA in the United States, FAO, and U.S. universities.

There are additional international research groups which deal with other crops related to the area in which the institutions are located. In addition to nurseries available to fit the general climatic conditions in Somalia, these organizations can provide information on innovations in farming practices and equipment suitable for the small farms in the Bay Region.

Implementation Plan

September 1980 - complete inventory of quantity and varieties of seed presently being used in Bay Region. January 1981 - launch educational program to teach farmers the importance of good seed usage. Program should include teaching farmers and extension workers simple methods of germination tests, village field trials as demonstrations

indicating the importance of good seed selection and the need to plant pest protected seed. The seed specialist should develop at least a three-year time phased educational program both at the regional and village level. Sufficient quantities of all of the sorghum varieties and mixtures in production in the rainfed and irrigated areas will be collected. Included in these should be the current local types in production. These are Martin, Local White, Chalky White, Red Compact, and Dark Red Compact.

The collection will be grown in sufficient amounts to be classified Promising lines or varieties can be selected for further increase and eventual testing in comparative yield trials. In the past, this selection method resulted in the identification of several improved varieties in a relatively short period at the Bonka Station. Selection criteria should include yield, early maturity, short stature, the preferred color and grain eating quality, stability, drought and pest resistance. These characteristics are not necessarily listed in priority but should serve as a guide in the ultimate selection process.

October 1980 - prepare plan and plant first seed increases during the Der season with a view of second increase during the following Der season. This activity must be closely coordinated between research and extension.

December 1980 - develop a seed policy in regard to financing, storage, distribution and sale of improved seed for the seed producer and end users.

July 1981-84 - plan annual evaluations and program adjustments per discussions with all principals working in seed improvement, crop production and representatives of the consumers.

Research through December 1980 will be conducted at the Bonka Training Center; this project assures continuity of the seed specialist and development of the seed farm based on project's recommendations.

Time of Planting

Time or date of planting studies conducted throughout the world have demonstrated that early planted crops generally give higher yields than delayed plantings. This has been shown to be true for practically any crop. While time of planting for rainfed crops is actually determined by the rainfall pattern, planting before the anticipated commencement of the rainy season is recommended. This may mean planting seed in dry soil one week or more before the onset of rain. Dry seed planted in dry soil will usually store for the period of time mentioned. This practice may not be advisable under circumstances where bird and rodent depredations occur on newly planted land. Insecticide treated seed generally will prevent insect damage caused by soil inhabiting insects.

Early planting will have the following advantages:

1. It will enable the crop to take effective advantage of the total amount of rainfall occurring during the season.

2. If early maturing varieties or types are available for planting, the crop will have even a greater opportunity to reach maturity by fully utilizing the available soil moisture.

3. Early planted crops may take advantage of any higher natural soil fertility present at the beginning of the rainy season.

4. Early planted crops may escape or have less damage from insect

pests or diseases which tend to increase as the rainy season progresses.

5. Any soil moisture remaining after the crop is harvested will facilitate land preparation in anticipation of double cropping the land.

6. Early planted crops mature earlier thereby facilitating early harvesting in areas where bird populations increase as the season progresses.

7. Early planting may be desirable to avoid time conflicts with other crops during the harvest period.

8. An early planted crop also lends itself to the possibility of reseeding the land if emergence is poor after the first heavy rains have occurred. Seed should germinate and emerge within at least six days after a good rain. If emergence is poor, then reseeding can take place immediately.

Planting Depth

The recommended depth of planting for sorghum is from 2.5 to 5.0 cm. Percentage and rapidity of germination and emergence are often reduced by planting deeper than 6 to 7 cm. Shallow planting may also result in poor emergence, because the soil may dry too rapidly near the surface permitting seed to be exposed or in contact with dry soil. If soil crusting is a problem, seed should be planted about 2.5 to 3.0 cm. in depth.

Seeding Rates

An accurate seeding rate recommendation is one of the most difficult to make where low quality seed or questionable seed is used. Generally speaking, the best recommendation is to use large amounts of seed. This

may be double or triple the rate farmers would usually plant. The normal tendency is to plant the smallest amount of seed possible to obtain a crop even though there may be uncertainty as to seed quality. Determination of more precise seeding rates should consider at least three factors :

1. Germination percentage (seed viability)

2. Seed size

3. Seedbed condition

The following practices are recommended:

1. Plant seed having 85 percent or more germination.

2. Plant the largest seed available. Greater vigor may be closely correlated to seed size. High vigor seeds tend to tolerate deeper planting and will better emerge through crusted soil.

3. A firm, fine seedbed without the presence of large clods is desirable. Seed should be placed in a firm bed which will facilitate more uniform and close soil-seed contact.

4. Number of sorghum seeds per kg. may vary from 3500 to 8500 per kg. depending on the type or variety and individual seed weight. An estimated planting rate for the Bay Region using present quality of seed, should range from 4 to 6 kg. per ha. This rate should produce a stand of more than 12,000 plants per ha. Seed containing large numbers of cracked of broken seed should be planted at a higher rate. If the resulting stand is too dense with respect to the available soil moisture and nutrient supply, yields will be greatly reduced. Thinning the stand would be recommended in this case.

Seeding rates used in the U.S. are based primarily on the prevailing rainfall patterns for each production area. In semi-arid areas a rate of 2 to 4 lbs. per acre is commonly used. Higher rates are planted in areas of increasing rainfall. Heavily fertilized, irrigated land may be planted at a rate of 10 to 14 lbs. per acre to produce as many as 100,000 or more plants per acre.

Seeding rate for the rainfed region in Somalia can be determined more accurately when adaptive research studies are carried out to compare improved versus local practices with the crop.

Seed Spacing

Seed spacing in the field is related to the seeding rate. Other factors to consider are the tillering characteristics and the inherent height of various varieties. Sorghums which tiller very little may be planted at higher rates with closer seed spacing than varieties which tiller heavily. Tillering is also related to the soil moisture and nutrient availability. Tillering is usually greater on fertile soils. Short types of sorghum can be spaced closer together while intermediate and tall types require wider spacings.

If row seeding is used, a recommended spacing between rows is about 1 mt. Ultimate spacing within the row will depend upon the emergence density of plants. Seed may be planted about 1 to 2 cm. apart. If emergence is satisfactory, plants can be thinned when they reach a height of 10 cm. or so to leave a space of 30 cm. between plants. Tall types may be spaced around 40 to 50 cm. in the row. The use of a small seeder, such as the Planter Junior type, is highly

recommended for row planting.

In the Bay Region seed is planted by hand, broadcasting after the rainy season has begun. Several seeds are placed in shallow depressions formed by a hoe. Soil is pushed over the seed and compacted by the planter's feet. Most farmers will hoe the small depressions throughout the entire field before returning to place seed. This allows the moist, exposed soil to dry. An improved practice would be to place seed immediately after hoeing, covering seed to the proper depth and pressing the soil firmly several times to insure good soil-seed contact. Depressions formed in the bed should be deep enough to accumulate any rainfall. This practice will hasten the germination and emergence of seedlings.

Plant spacing used by farmers depends on custom, type of hoe used, and ease of planting suited to individual farmers. Each group of plants emerging may be referred to as a hill. With this method of planting, plants should be thinned to permit a spacing of 30 to 40 cm. between plants in each direction. Taller plant types can be thinned to 50 to 60 cm. Distances suggested are guides to seed spacing. Adaptive research should be initiated to determine optimum spacing for recommended cultural practices.

Seedbed Preparation and Moisture Conservation

Seedbed preparation or tilling the soil is normally not practiced on small farms in the Bay Region. However, "bunding" or forming small ridges of soil by hand around a field or within a field to form a series of adjacent rectangular basins is practiced on some farms to prevent rapid rainfall runoff. This is a good practice to allow for increased

water penetration and storage in the soil.

Use of animal power to pull tillage implements would greatly increase the efficiency of seedbed preparation, permit improved practices such as row planting, and other benefits listed below:

1. Permit farming more hectares.

2. Provide transport to haul manure to fields for spreading before plowing.

3. Permit shallow plowing or harrowing to remove weeds and turn under unharvested crop residue.

4. Permit use of a spike-tooth harrow or a wood drag or float to form a firm, friable seedbed.

5. Permit the use of a plow to form bunds or ridges to prevent rapid water runoff.

6. Permit the use of sweeps or cultivators to form shallow or deep furrows in which seed may be placed for row planting. Row planting is highly recommended for more uniform crop stands and to facilitate weed and pest control. A furrow could also collect rainfall.

7. Permit the adaptation of a small single row planter.

8. Permit use of row cultivators to remove weeds.

9. Provide transport to speed removal of crops and reside from ffields.

Weed Control

Weeds should be removed as soon as they emerge to prevent the following deleterious effects:

1. Weeds remove moisture and nutrients needed by crops.

2. Unlimited weed growth competes for light needed by crops.

3. Weeds may also be hosts for insect pests and provide reservoirs for certain fungi, bacteria, virus diseases and nematodes harmful to crops.

4. Weeds allowed to mature and produce a seed crop will reinfest the land. Uncontrolled perennial weeds can eventually render the land useless, as many spread by vegetative growth and are extremely difficult to control.

5. Weeds allowed to reach a stage of growth where deep hoeing or cultivating is required to remove them will damage crop roots.

6. Uncontrolled weed growth impedes crop inspection, insect control and harvesting.

Recommendations

1. Hoeing weeds is an obvious recommendation, however it is a laborious and time consuming activity. If hoeing is used, weeds should be removed as soon as emergence takes place. This will reduce moisture loss from the soil and require less effort.

2. Row planting is highly recommended. Rows permit the use of animal pulled cultivators to remove weed growth as it emerges.

3. The use of a wheel hoe is recommended. This hoe is pushed by the operator and can be used successfully to remove weed seedlings. The wheel hoe could be modified for animal pulling.

4. Herbicides can be used in a later stage of advancing technology in farming. They would be useful during rainy periods when fields are too wet to cultivate.

Fertilization

The growth of all crops is strongly responsive to soil fertility. All land which has been cropped for any period of time will decline in fertility unless nutrients can be restored to the soil in some manner. Crop development limited by any nutrient deficiency will result in low efficiency in the use of available soil moisture. Drought tolerance in any crop is determined to some extent by nutrient levels. Crops deficient in nutrients will not withstand droughts as well as crops with higher levels of nutrients available.

Animal Manure: Benefits from applying animal manure have been demonstrated, and its use is recommended. However, there is some question as to the availability of quantities of manure required in the rainfed farming regions of Somalia. A source may be in concentrated poultry and feedlot dairy operations.

Green Manure: Green manure means a crop grown for the purpose of maintaining or increasing soil fertility by turning it under at the desired stage of growth. The crop may be allowed to grow to its maximum vegetative growth and then plowed under to add green organic matter and nutrients to the soil.

Legumes are preferred crops for green manure, although practically any crop may be used. Legumes have roots-modulated with nitrogen fixing bacteria which provide nitrogen for the plant. When used as green manure, some of the nitrogen is available to the next crop grown. The crop should be turned under before maturity is reached. If only small tillage equipment is available, this is advisable. Mature crops are

more difficult to handle due to larger masses of dry matter and require use of larger equipment to turn under a crop in one operation.

While green manuring is recommended, small farms are generally not in a position to grow green manure crops because no direct food or sales product is provided by the crop. Where groundnuts or other legume seeds are grown for food, the crop could be harvested, and if tillage equipment is available, the residue could be turned under to add organic matter and nutrients to the soil.

Chemical Fertilizers: Application of chemical fertilizers is the most efficient way to maintain soil fertility, as well as the most expensive source of nutrients. Farmers still using unsophisticated technology are rarely able to afford the use of chemical fertilizers.

Use of animal manures and green manure crops is recommended in Somalia. Elements usually applied in chemical fertilizers to increase soil fertility are nitrogen, phosphorus and potassium. There may be instances where trace or minor nutrient element deficiencies occur. These deficiencies may be corrected with applications of chemicals composed of the required elements. In any situation, the maximum use of animal and green manures will help to alleviate mineral deficiencies and provide organic matter to the soil.

Crop Rotation

Use of crop rotations can be highly beneficial in helping to achieve sustained economic crop yields. Rotations are recommended for the following reasons:

1. Green manuring with legume crops in rotation with grains add

organic matter, nitrogen and other nutrient elements to soils.

2. Reduced insect and disease inoculum potential is achieved by the use of specific crop rotations with forages in them to prevent a carry over of specific diseases, insects and certain root infecting nematodes. Each crop type may have certain specific problems.

3. Use of forage crops between food crop sequences will reduce pest populations and potential diseases peculiar to cultivated crops. Forages would also provide a practical means of feeding small farm herds of animals after crop residue are exhausted as a feed source. Perennial forage plants are less susceptible to droughts that severely reduce yields of annual crops. Since forages are not grown for a seed crop, any vegetative growth may be utilized.

Most perennial forages are more dependable in production than annual crops grown under limited rainfall. A disadvantage of perennials for small farm use is the greater energy and time requirements of perennials for their removal. Dense, extensive root systems make plowing and seedbed preparation very difficult without substantial tillage equipment..

Control of Insects and Diseases

Harmful insect infestation is a serious problem confronting crop production and storage. Insect pests are present for every type of crop grown in the Bay Region but little is known about most insects or their control. Insects have been known to completely devastate crops in both irrigated and rainfed areas. Level of infestation may vary from season to season. There is a belief that insect damage to crops is often

less severe in rainfed areas. Regardless of the geographic location and farming system, certain principles apply to insect control, such as:

1. The first principle is to plant types and varieties of crops known to have resistance or tolerance to important insects found in the area. It is likely that there are few, if any, varieties or types known in the region which have resistance. If one is known, there is very little seed presently available for distribution to farmers.

2. The use of crop rotations is probably the most useful practice available to farmers at this time. Rotations are helpful in reducing insect numbers and in reducing the amount of acreage of any crop-specific harmful insects.

3. Widespread use of insecticides in fields is not recommended for farmers in their present stage of technological development. The reasons are:

a. All insecticides should be considered dangerous. Many are highly toxic to many forms of life. Insecticides should be used only by persons with the appropriate level of knowledge and understanding of uses and dangers involved.

b. Insecticides are very expensive.

c. Indiscriminent use may be more harmful than beneficial by reducing or destroying populations of predators and parasites that attack harmful insects.

An exception to these recommendations may be in seed treatment with insecticides to protect seed and young plants. A commonly recommended chemical is Malthion. It is effective for both seed and grain storage

and is one of the least dangerous chemicals. At time of planting, seed may be sown along with the granular form of carbofuran (Furadan). This insecticide is highly effective in controlling spotted stem borer and many other insects. Carbofuran is a systemic acting compound and gives long lasting protection. The liquid form of Furadan is not recommended. It is highly dangerous.

Early planting of early maturing crops is a recommended procedure which utilizes a shorter growing time required to reach maturity before insects increase in numbers as the season progresses.

Disease Control

There are very few references to any disease control for crops grown in Somalia. There are undoubtedly many diseases appearing from time to time. Some may have economic consequences.

1. The first recommendation is to plant varieties resistant or tolerant to prevailing diseases.

2. In the absence of resistant varieties, crop rotations may be effective in disease reduction by lowering the inoculum potential.

3. Use of sprays or dusts to prevent or reduce diseases in crops is often not economically feasible. The exception may be in a highly intensive culture of high value crops. Small farmers could possibly utilize chemicals on small hectarages provided they have reached a higher technological level than that presently known and applied.

4. Control of known seed borne diseases has a high probability of success, because highly effective fungicides are available for seed treatment which does not require expensive equipment or complicated

procedures. A disadvantage is the high cost of chemicals. Many smut diseases are readily controlled with seed treatment fungicides.

5. Seed borne diseases can be greatly reduced by selecting disease-free seed.

Miscellaneous Pest Control

1. Birds can present a serious problem in many crops, especially grains. Most sorghums are vulnerable to many types of birds in all irrigated and rainfed regions. In areas where birds cause serious losses each year, consideration should be given to crop substitution. Other alternatives are to plant varieties which are resistant to birds by virtue of unattractive taste, size and hardness of grain. Early planting of early varieties also may be suited to a particular area where bird populations tend to increase later in the growing season. Early varieties might be harvested before the arrival of large flocks of birds.

Plant Parasitic Nematodes

Some control of certain nematodes is possible by long term rotations of crops not known to be susceptible to the nematodes, by practicing good weed control where weeds may be host plants, and by early planting of early varieties to shorten the period in which nematodes may reduce crop yields.

Use of resistant varieties, if available, is highly desirable. Soil fumigation is effective for reducing root attacking nematodes; however, this is not often a practical solution for many field crops.

Harvesting and Storage

The ideal situation calls for crops to be harvested as soon as seed maturation is complete and sun drying in the field has reduced moisture content to the extent possible for local climatic conditions. Moisture content of grain when harvested should be around 25 percent or lower. Low grain moisture content in the field is preferred. This means less time and effort in drying grain after the harvest.

Crops may be subjected to insect infestations, disease, birds, or continual exposure to rainfall. Occurrence of any of these problems requires crops to be harvested as early as possible to reduce losses.

Sorghum grain is mature when the seeds are fully colored, have begun to harden, and the black layer forms at the base of the seed. Harvesting should take place at this stage of maturation or possibly a little earlier to avoid any depredation losses. Other recommendations for efficient harvesting are:

1. Plant short varieties or types. Short stalks make for easier harvesting.

2. Field transport (oxen drawn wagon). The use of wagons would speed the harvest process. If a tall type is grown, a wagon bed could serve as a platform for workers breaking or cutting heads off stalks. Heads could be hauled in the wagon to a drying area. Stalks could be cut and hauled at the same time if there is sufficient labor and time available.

3. If the crop has not achieved uniform maturation, later maturing heads should be removed as maturation takes place. Do not mix green heads with mature heads, as drying time will be delayed. The same

holds true with mixing green and mature theshed seed.

4. Nonuniform maturation of crops can be alleviated by using improved types or varieties which have uniform maturation characteristics. Uniform maturation can be promoted by planting good quality seed at an even, recommended depth in a properly prepared seedbed so the soil moisture is sufficiently and uniformly distributed. This will support rapid emergence and put all plants at the same stage of growth. All of these recommendations will enhance harvesting.

5. Removal of stalks from fields can provide a source of income if sold for feed or provide feed for farm animals. Prompt residue removal also helps to control insects or diseases by removing host sites for reproduction.

Threshing

Grain separation from heads is facilitated by drying. Do not pile heads in storage before drying, as molds will develop due to excessive moisture in the grain. Heads should be spread out in a loose, single layer on a hard, clean surface to sun dry. After drying as much as possible, grain can be threshed and spread thinly on a hard surface to further reduce moisture content by sun drying.

Grain Storage

Grain entering storage should have a moisture content as low as possible, not over 12 percent. If it is put into storage at contents greater than 12 percent, damage is inevitable. Molds will develop, grain will be susceptible to insects, and heating will occur to further lower quality.

In order to dry grain more rapidly, foreign material such as green or manure crop residue, soil, and immature grain must be removed. Grain will store safely for longer periods of time if the moisture content can be reduced below 12 percent.

Removal of foreign material by hand sorting from grain presents a laborious and inefficient process. Winnowing will speed cleaning of grain. Even superficial cleaning will improve grain quality. Use of some type of screen to separate grain from other material would greatly improve cleaning efficiency and grain quality. A desirable method is to use a mechanical thresher. Small, portable, plot-type threshers or larger portable models can be used on a village basis provided adequate supervision is provided.

Dry grain should be placed in a water tight, rodent proof storage which is as clean and as free of insects as possible.

Insects found in stored grain and seed at Afgoi have been identified. Many are common in cereals as well as stored legume seed, oil seed and processed seed products:

1. Rice weevil, Sitophilus oryzae (L.)
2. Maize weevil, Sitophilus zeamais (Motsch)
3. Angoumois grain moth, Sitotroga cerealella (Oliv.)
4. Saw-toothed grain beetle, Oryzaephilus surinamensis (L.)
5. Confused flour beetle, Tribolium confusum (Duval)
6. Red flour beetle, Tribolium castaneum (Herbst.)
7. Cadelle Beetle, Tenebroides sp.
8. Fungus beetle, Carpophilus sp.
9. Rice moth, Corcyra cephalonica (Staint.)
10. Mealworm, Tenebrio sp.
11. Cockroaches, Periplaneta americana (L.)
12. Bean weevil, Acanthoselicides obtectus (Say.)
13. Cowpea weevil, Callosobruchus spp.

Insects identified as eating only whole grains or seeds are numbers 1, 2, 3, 12, and 13. Insects eating only cracked or broken seeds are numbers 4, 5, and 6.

Principles and Practices of Improved Crop Production

All principles and practices described and recommended in the preceding part of this section must be applied in a timely manner to obtain maximum benefits from them. Timeliness is a critical part of any farm management decision. Extension agents will be taught the importance of this fact time and time again. A suggested outline may be used as a guide for teaching extension and research personnel, farm managers and farmers principles and practices of improved crop production in their sequence and relationships to timely operations. Use of germination tests, insecticide application procedures for treating seed, etc. should be an integral part of the training program.

Stages and practices shown in the outline below are placed in chronological order and suggested priority. A practice may be modified to suit a farming system, the level of technology achieved by an individual farmer, and the "Gu" or "Dir" season of the year. The "Gu" season is used to illustrate preparations required for a typical farming operation during one crop season.

Stage I -(Preparatory measures taken in February and March)

1. Procure quality seed of the variety or type recommended for your area. If not available, select your own best seed on the basis of appearance and germination test results.

2. Inspect frequently stored seed to be planted.

3. Take a representative seed sample for a germination test. More

than one test may be needed. Use seed of the highest possible germination percentage.

4. Inspect and repair farm implements prior to field work. This should be done as early as possible to prepare for the season.

Stage II - (Land preparation and planting in March)

1. Apply manure as early as possible. Apply commercial fertilizer if available or applicable.

2. Prepare bunds around fields as necessary

3. Plow and cultivate to turn under manure or crop residues and to control weed growth.

4. Prepare a firm seed bed by light harrowing and dragging.

5. Plant seed in bottom of furrows if row planted. If not, plant seed as soon after hoeing the holes as possible and press firmly.

6. Plant at the recommended rate and spacing for the crop and your area.

7. If poor quality seed is planted, double or triple the seeding rate. Germination tests and observation can help determine quality.

8. Apply insecticide in the furrow or bed as seed is placed in the soil.

9. Cover seed immediately to the proper depth for the crop. If soil is moist, immediate covering will prevent drying of the soil in contact with the seed.

10. Compact the soil over seed.

Stage III - (Late March, April, May)

1. Inspect fields carefully to ascertain seed emergence.

2. If no emergence is visible 5-6 days after planting in wet or moist soil, examine seed in the furrow to see if germination has occurred.

3. If a considerable amount of seed has not germinated but weeds are emerging, shallow cultivate to remove weeds.

4. Replant fields immediately with reliable seed.

5. After seedlings emerge and grow to 10-12 cm., thin the stand to suggested spacing for the crop if excessive plant population emerges.

6. Continue to inspect fields regularly to determine need for weed or pest control. Shallow cultivate if excessive weed growth occurs. Apply herbicides or insecticides when applicable.

7. If the crop planted is for green manure, pest control may be eliminated unless weed growth is excessive. Plow under when maximum vegetative growth is reached.

8. Continue to inspect fields to determine stage of maturity.

Stage IV - (July)

1. As maturity is approached, grain should be completely colored, begin to harden, and the black layer formed at the base of the seed. Harvesting should take place at this stage to avoid losses due to insects, diseases and birds.

2. Remove crops as rapidly as possible from fields to limit losses. Place heads on a hard, clean surface to sun dry. When heads are as dry as possible, thresh grain carefully to prevent damage. Use a mechanical thresher where possible.

3. Selection of seed for own use may take place at this point. Heads selected should be dried, threshed and stored separately from the remainder of a crop.

4. Remove stalks or crop residue from fields. Clean grain by screening or hand sorting to remove green material and other foreign matter. Dry grain to lowest possible level of moisture content (12 percent or lower). If a reliable moisture tester is available, tests can be made with it. Experience with grain will also give a good indication of moisture content.

5. Clean storage bin or site to remove old grain. Spray grain contact surfaces or sacks with insecticides to control insects. Spray or dust grain or seed when put into storage. Storage site should be bird, rain and rodent proof and shaded. The same procedures are used for earth-pit storage.

6. Inspect grain or seed frequently for insects or heating. Insecticide treatment may be repeated again if necessary. If grain is heating, remove the dry again.

7. Continue to inspect grain storage for insects.

Research Strategy

Research Programs

At the present time there is an active demonstration/research program in progress which deals exclusively with rainfed crop production. Although production problems for most crops are only superficially understood, results of the ongoing 649-0101 project will contribute substantially to the extension package being developed for the Bay Region.

In suggesting a research program for rainfed crop production, the initial thrust should be on adaptive research to develop improved technology and practices suitable for small farms. Now, the level of technology is low in comparison to modern technology practiced in advanced agricultural production areas. Research should emphasize the importance of sorthum culture in the rainfed areas. As research progresses, as trained technical manpower and support facilities increase, and as results are extended to farmers, increasing attention can be directed to other crops.

There are several sources of applicable technology available in the world today which may be used to great advantage to reduce the time lag from initial development to the release and extension of the improved technology. These sources can be used in an adaptive research program to increase crop production in Somalia.

1. Simple, hand operated threshing equipment.

2. Animal traction tillage and planting equipment.

3. Techniques used to develop maximum efficiency of traction animals (e.g. types of yokes, harnesses, handling and training equipment, etc.)

4. Grain drying techniques, grain storage structures, on-farm techniques for using germination tests and estimating grain moisture content.

5. Recent innovations in mixed cropping or inter-cropping.

Other suggestions for adaptive research to be conducted are as follows:

1. Studies to determine seeding rates, seed spacing, depth of planting, pest control, crop rotations and green manure crops, time of planting, and earth-pit storage improvements.

The Bonka Training Center activity dealing with animal traction should be expanded to include drags or harrows to improve seed bed preparation and moisture conservation, the adaptation of hand operated wheel hoes and single row planters for animal traction use.

Summary

The basic strategy is to increase crop yields by introducing principles and practices presently known to be beneficial for rainfed and irrigated agriculture. In undertaking how improved technology will increase crop production, emphasis is placed on methods which are feasible for small farms. To be immediately and most useful, practices proposed are more labor intensive than capital intensive. The intent is to aid

each farm family to become more productive by making certain that their efforts result in higher yields for the time applied to crops in production.

Much of the information presented in the review of crops grown in the Bay Region was gathered from reports of research conducted from 1966 through mid-1970 by the Wyoming group at the Bonka Research and Training Center located near Baidoa.

Research was directed principally to improving sorghum yields. Selections made from local varieties of sorghum proved to be adapted in varying degrees as evidenced by the improved yields obtained with the use of improved cultural practices. Responses to increased soil fertility levels were notably high. There is little known concerning the problems of other crops in the Region. Maize does not appear to be adapted throughout the rainfed region, but several crops have exhibited good potential for acceptable yields. These are groundnuts, sesame, sunflower, cowpeas, and millet.

In the discussion of principles and practices suggested for improving rainfed crop production, the emphasis was placed on alternative practices which can be useful on small farms at this present low level of technology. Several recommendations are aimed at farmers capable of utilizing higher levels with adequate resources and supervision of practices by trained extension personnel. Other recommendations are made which could be implemented as development and acceptance of higher levels of technology are projected for the future.

Many practices described are specific for Sorghum and similar grain crops; however, the principles are applicable to other crops grown under both rainfed and irrigated conditions. Modifications determined by adaptive research would be necessary for certain cultural practices used for crops such as groundnuts and sesame.

Conclusions

By applying the existing modern techniques already developed for rainfed agriculture, there is little doubt that improved crop yields are attainable for most crops grown in the Bay Region of Somalia. Wherever the introduced technology is not applicable, research should be initiated to deal with problems specific to the region.

Sorghum is the most important crop. Any research program developed for the Region should reflect its importance, keeping in mind that the principle limiting factor in crop production is low and irregular rainfall. Major emphasis should be placed on adaptive research which will provide improved practices and technology appropriate for small farms.

An equally important function of a research program is to provide technical training for Somali research personnel. As the competence and number of locally trained technicians increase and participant trainees return to the program, research can be expanded to include other crops in the Bay Region.

Along with the application of proven techniques and the development of improved practices and technology by adaptive research, their practical application in the field will be dependent on the relationship between research and extension functions. Every effort on the part of the research-extension complex must be made to extend the technology widely among farms in order to achieve the ultimate goals of increased crop production and greater well-being for farmers specifically, and for all Somalis generally.

ANNEX IX

LIVESTOCK ANALYSIS

AGRICULTURAL DELIVERY SYSTEMS

Background

Although much of Somalia is classified as arid or semi-arid, which primarily contributes to the agricultural base of nomads or to the practice of pastoralism, there are large areas (8.2 million hectares) of productive land within the Inter-Riverine Area Region of the Shebelli and Juba rivers that have an even greater potential for livestock production; the Bay Region comprises the center of this dryland farming area. Within this vast region, 50,000 hectares are in controlled irrigation, 110,000 hectares in uncontrolled irrigation, 54,000 hectares in rainfed farming, and the remainder is potentially cultivable land which is principally used for grazing by both small dryland farmers and traditional nomads.

The livestock population in Southern Somalia, particularly within the Inter-Riverine Region is about 1,927,000 camels, 2,340,000 cattle, 805,000 sheep, and 1,568,000 goats for a total of about 6,640,000 head of livestock. This animal production capability represents 20 percent of the total livestock production within Somalia and is being produced on 13 percent of the land base.

Within Somalia there are 180,000 (80 percent in the Inter-Riverine Region) subsistence, dryland farms representing two systems of crop and livestock integration. The first system represents the village of about 5,000 people with each farming family utilizing 305 hectares for cultivation. Cultivated crops consist primarily of sorghum with some sesame, cowpeas, and groundnuts. The livestock population is comprised

mainly of cattle, half as many goats as cattle and half as many sheep as goats. Livestock are grazed away from the cultivated land but are returned at night to fenced enclosures within the village. During dry seasons livestock become separated from the confinement of the village and are taken to areas of better pastorage. Usually a small number of chickens such as Rhode Island Red, White Leghorn, and native types or a combination of all three, are found within the village. Chickens are used mainly for festive occasions. Egg production is very low.

The second small farm system integrates the same production base, but livestock are kept separated from the village for most of the year. Periodically livestock are returned to the village to utilize various crop residues and aftermath.

The ultimate goal of the GOS is to become self sufficient in food. At present, the GOS is a net importer of food. The goal of self sufficiency in food production can be greatly enhanced through increased yields at the small farm level. The Agriculture Delivery System Project can help achieve this ambitious goal with specialized training in livestock management for farm managers and through extension training programs for the small farmer.

At the present time, farm managers lack the technical skills and knowledge to efficiently operate the livestock production sector on either various state farms or small farms. Small dryland farm managers also lack skills that would allow them to optimize production through crop and livestock management coordination.

Responsibility for livestock and farm management training has been assigned to the MLFR. The National Agriculture College, the Secondary Agriculture School and the Veterinary College have provided the curriculum and training. The first two institutions have lacked the expertise to provide appropriate training for farm managers and livestock specialists. The Veterinary School, however, has a good program in applied animal health, but lacks the technical competence in other areas of animal husbandry. The MOA maintains the only NES, but extension agents are only modestly trained in techniques of crop production and have had no training in principles and methods of livestock management.

Linkages between the MLFR and the MOA are vague, and the National Extension Service deals primarily with crops. Emphasis in the MLFR has been in animal health utilizing a cadre of veterinarians and assistant veterinarians officed at the region, district and village levels. Livestock research strategy has been limited to animal health programs.

Linkages

Project 0112 will emphasize training and development of technical skills in livestock production (i.e., meat, milk, fiber, etc.) at the farm manager level and provide competent expertise via the National Extension service to management of small farms.

The Livestock Research strategy under Project 0112, the Ag. delivery systems project, will be centered around the discovery of improved management systems for small stock. The emphasis will be on increasing production on dryland farms -- this research will be especially applicable to Bay Region farmers who typically own small

flocks of sheep and goats and a few poultry. The project will complement the demonstration plots and the gathering of baseline data in the Bay Region project. While selection to improve indigenous sheep and goats is carried on at Bonka to gather information related specifically to Bay Region production, research at Afgoi will extablish the most effective crossbreeds.

The Ag. Delivery Systems project will establish a trained cadre in livestock production for MLFR, provide livestock extension through NES, and disseminate applied research information to managers of small dryland farms. Research goals and objectives will link the MLFR with the NES through a national coordination committee. The agents produced under this project will be available in year 4 in the Bay Region.

Livestock Extension Training

Emphasis of livestock extension training will be to assist managers of small dryland farms to improve animal health through a concentrated program of vaccination and parasite control, improved feeding practices, improved management practices and animal selection.

Livestock Research Strategy in the Bay Region

The demonstration of improved management techniques related to the production and the rearing of sheep and goats will be carried out at the Bonka Research station under the contract of the officer in charge of research. No elaborate nutritional studies or breeding programs are contemplated. The operations will serve as a teaching tool for the extension agents and will also be a source of economic data to illustrate the value of utilizing simple improved practices.

The production of sheep and goats is an important part of the typical small agricultural enterprise. They are herded near the village and return to an enclosure each night. The possibility exists for greatly expanding production with the same number of animals simply by improving management techniques. The present mortality rate is reportedly very high. The courses are known. Both sheep and goats have a foot rot problem during the rainy season that causes incapacitation and death from starvation. This problem can be controlled by the construction of copper sulfate foot baths that are simple to construct and the treatment is virtually fool proof. A serious disease problem exists with goats -- contagious caprine pleuro-pneumonia (ccpp). This disease can be prevented with a vaccine that is produced in the Vaccine and serum production laboratory in Mogadishu. Parasites are a serious problem with the production of sheep and goats. Simple control programs will be tried, evaluated and the information made available through the extension agents. A demonstration unit at the Bonka station will become a teaching facility for the extension agents to learn these simple practices.

It is planned to purchase 20-40 does and the same number of ewes from local flocks. Native males would be selected that conform to the most acceptable type of animal in the area. The flocks would be managed similar to the common practices but with some critical basic difference. Breeding would be controlled so that animals are born

at the most favorable time of the year. Fodder would be reserved for the dry season so that the animals would not go through nutritional stress and would be able to produce at the maximum potential. Some of the offspring could be given special treatment and nutritional consideration so they could demonstrate their genetic capability. Economic data would be accumulated and as a result of this simple research-demonstration activity a package of improved technological practices would be developed to be utilized by the extension agents. It is essential that this data be gathered as endemic stock prior to the importation of improved breeding stock.

In addition to the development of smallstock basic research, there is scope for the development of poultry at Bonka Training Center. The Bay region is the area where the majority of Somalia's grain is produced. Poultry flock at Bonka could be maintained to serve as a chick source for farmers in the area.

For the most part, women are in charge of poultry and the establishment of a small breeding flock to upgrade backyard stock would ensure the participation of women in the activities at Bonka. Inputs required would be improved chicks, concentrate feeds and medications.

Animal Health

Extension agents will assist farmers in the Bay Region with animal health care. Although animal health and disease are primarily under control of the MLFR, much can be gained by farm managers and extension agents by understanding rudimentary principles. Economic loss to the Somali livestock industry due to disease and parasites through death, loss of weight, inefficient utilization of feed and

carcass degradation is extremely high. Estimated losses from death are as high as 40 percent of those that survive birth. Farm managers and extension agents should be taught that sanitation and disease prevention should be a primary consideration. Items to be considered are:

a. Adequate water resources.

b. Appropriate facilities.

c. Causes of death.

d. Preventative treatment (i.e., dipping, spraying, drenching, vaccinations, etc.)

e. Lambing or calving difficulties

f. Foot diseases and appropriate treatment

g. Castration.

Nutrition: Feed represents the largest single production cost in all types of livestock operations. Knowing what to feed is just as important as knowing when animals should be fed. Nutrients of primary importance in livestock production are water, energy (as measured by total digestible nutrients), protein (as indicated by crude or digestible protein), and minerals (particularly salt, calcium and phosphorus). Total digestible nutrients and digestible protein have been established for most major crop products available in Somalia. (See the US National Council Bulletins on Nutrition Requirements for Cattle and Sheep). At present Somalia has an excess of crop residues that could double or triple the growth and finishing rates in livestock and poultry, Table 1. Farm managers and extension agents should have a basic understanding of:

a. Nutritional requirements of livestock (i.e. during estrus, anestrus, lactation and post partum interval to breeding, etc.)

b. Methods of formulating rations.

c. Items to be considered in formulating rations:

i. The performance of alternative feeding programs.

ii. Type of livestock to be fed.

iii. Biproduct sources to be used in supplemental rations.

Adequate nutrition will result in faster growth, more animals reaching puberty at an earlier age, higher reproductive rates, and reduced interval between birth and the marketable product. Ultimately, better nutrition will result in a better quality and increased quantities of meat and milk.

As a result of incremental grain and pulse production in the Bay Region produced under the project, more by-products will be available for animal feedstuffs. Farmers will be able to conserve sufficient fodder and grain to maintain their stock throughout the dry season.

Table 1. Summary of the Potential By-Products in Somalia and Their Nutritive Value When Used as Animal Feeds

By-Products	Annual Production	TDN	Annual TDN Production
	Tons	%	Tons
Banana Stems	200,000	50	100,000
Sorghum and Maize Stover	600,000	52	310,000
Rice Straw	6,000	40	2,400
Wheat Straw	3,000	50	1,500
Sesame Stalks	150,000	40	60,000
Sugar Cane Tops	20,000	30	6,000
Bagasse	133,120	41	54,579
Cotton Stalks	20,000	40	8,000
Cotton Seed Hulls	660	44	290
Fruit Processing Products	1,200	55	660
Wheat Bran	4,390	66	2,897
Sesame Cake	10,000	71	7,100
Cottonseed Cake	3,000	70	2,100
Groundnut Cake	4,000	70	2,800
Sorghum and Maize Bran	5,500	66	3,630
Blood Meal	917	84	771
Meat and Bone Meal	3,207	65	2,084
Fish Meal	1,000	72	720
Total			565,531

Management: Management of livestock and poultry, physical facilities available and related financing are the most important factors that will determine whether a particular livestock production system will be profitable. Without exception, producers rated as good managers will consistently show a profit. Farm managers and extension agents need to become familiarized with range management techniques and associated supplemental feeding programs. Factors that should be considered are:

a. Deferred grazing systems.

b. Rotational grazing systems.

c. Restricted time of grazing.

d. Use of crop residues, by-products and artermath.

Management principles and practices related to improved production should be familiar to the farm managers and extension agents. These should include:

a. Flock or herd requirem.

b. Feeding.

c. Breeding practices.

d. Calving or lambing.

e. Weaning.

f. Health

g. Selection.

6. Marketing: Marketing is the job of assembling, sorting, transporting, processing and pricing livestock and poultry, and distribution of their subsequent products. Although the marketing systems in Somalia

are rudimentary, nevertheless, farm managers and extension agents should be aware of some of the principles involved. These include:

a. How to make marketing decisions.

b. Pricing and competition.

c. Calf, lamb, and kid feeding industry problems.

d. Grades and grading.

e. Slaughtering and processing.

f. International trade opportunities.

Roads constructed under the Bay Region project will greatly enhance the access of outlying farms to markets. At present, the outlying districts have been accessible only during the dry seasons. Timely marketing of small stock and produce will result in increased income for farmers through greater off-take rates and less weight loss in transit.

Marketing principles will be taught to farmers through extension agents and through short courses given at Bonka Training Center.

Livestock Research Strategy - Country-wide

Cattle: At present, research in cattle emphasizes increased milk and meat production. Cattle under present grazing systems may only produce 1-3 liters of milk per day during lactation and take 4-5 years to reach an obtainable size for marketing. The 21st of October Dairy Farm at Afgoi has been conducting research which will result in higher milk yields, better feed utilization, faster rates of gain and better carcass quality. Probably research in cattle production will continue on the same basis under the MLFR and will not be discussed further.

Sheep and Goats: Sheep and goats represent a greater potential in terms of increased returns for small dryland farms than any other segment of the livestock industry. This conclusion is based on:

a. Lamb and mutton are the meat of choice in a Moslem society.

b: Greater return on net input, Table 2.

c. Faster turnover of investment, Table 3.

d. Lower risk.

e. Lower technical input requirements.

f. Greater foreign market potential.

To realize the potential for increased production, dryland farmers at the village level should increase the number of sheep and reduce the number of cattle. Dryland farmers would have to shift production from extensive to semi-intensive systems also. As cited, the conversion ratio could be as high as 1 to 10 in the direction of sheep. Goats should also be maintained in herds at present levels.

Table 2. Estimated Production Values for Lambs Grown and Finished Under Semi-Intensive Lamb Production Systems on Dryland Farms, Somalia

Begin. Age	End. Age	Feed. Period	Begin. Weight	End. Weight	Weight Gain	Feed Cons.	Daily Gain	Conversion (kg. feed/kg. Gain)
Days	Days	Days	Kg.	Kg.	Kg.	Kg.	Kg.	Ratio
135	255	120	20	39	19	174	.16	9:1

If lambs and kids can be weaned 3-6 months and maintained within confinement prior to and after weaning, total animals that would be required to keep on the range to produce the same number of marketable livestock could be greatly reduced. Consequently, small farms can decrease total animal numbers on the range to allow range production to increase. Concommitantly, they can increase female numbers. An optimum level of meat production, therefore, could best be obtained by maintaining female numbers for breeding that would provide the most offspring without over grazing the range or pastorage that is associated with the proximity of the village.

Conservative estimates of range carrying capacities, losses, levels of production and rates and efficiency of gain involved in tensive versus semi-intensive production programs are provided in Tables 2 and 3.

The information in Table 3 dealing with extensive sheep production demonstrates that the older the age at which sheep are marketed, the greater the grazing pressure on the range due to increased numbers of animals, the greater the loss, and the less efficiently the available range feed is utilized. For example total sheep numbers could be

Table 6.3 Estimated Production Values for Small Farm Sheep Production in Areas of Dryland Agriculture, Somalia

Production Item	Age of Sheep					
	3-6 Mo.	1 Year	2 Years	3 Years	4 Years	5 Years
Reduction in the total number of sheep if marketed as lambs rather than at older ages (%)	0	32	63	90	115	136
Loss (due to death) from sheep of older ages compared to lambs (%)	0	5	14	23	31	38
Kgs. of live weight available for market per 1000 breeding stock	10384	13756	16164	16518	14945	13454
Measures of feed efficiency						
Total feed consumed (kg)	207	411	852	1386	1824	2262
Net live weight gain (dg)	16	24	31	36	36	36
Daily gain (kg)	.118	.066	.042	.033	.025	.020
Conversion ration, kg. feed/kg. gain	13:1	17:1	27:1	38:1	51:1	63:1
Increased conversion ratio compared to lambing percentage (%)	0	31	108	192	292	385

decreased by 136 percent if lambs were marketed at 6-12 months of age compared to 3-5 years. Also, 40 percent of lambs available for market at six months of age would die if they were not marketed until they were 4-5 years of age. A smaller proportion of feed eaten by sheep is converted to meat when sheep are marketed at an older age, because of reduced growth rate due to maturity and also resulting from inadequate quality and quantity of feed particularly during the bi-annual dry season, and, because of increased maintenance requirements as they got older. From the example given in Table 3 13 kg. of feed are required to produce a kg. of live weight in lambs up to six months of age. Sixty-three kgs. of feed are required to produce a kg. of live weight gain if sheep are kept to 4-5 years of age. This means that the amount of feed required to produce a 4-5 year old animal on a per kg. basis is 385 percent more than that for lambs 3-6 months of age. Weight losses during dry seasons would require an additional 256 percent more feed or a total of 641 percent. Kgs. of live weight for lambs available for market for each 1000 head of breeding stock under optimal conditions is estimated at 10,384 lambs and increases each year of age until it reaches a high of 16,618 head for three year old animals. It then drops to 13,454 head at five years of age. The higher weight of sheep, if marketed at 3 years of age instead of at the younger age, is somewhat misleading because under proper management mother ewe numbers could be increased resulting in production of more lambs for market providing lambs are removed from the range. Also, a higher level of production efficiency would be maintained by feeding rather than grazing lambs.

If sheep are placed in semi-intensive production programs, feed lots or confinement at the village, they will gain more efficiently, although the cost of feed and of overall production will be higher, and be ready for market at an earlier age than if left entirely on the range. From the information in Table 6, lambs that are placed in the feed lot for four months, from about 4.5 to 8.5 months of age, will require approximately 9 kgs. of feed for each kg. of live weight gain. They will gain weight at the rate of .16 kg. per day. The 9 kg. of feed required to produce a kg. of gain in the feedlot can be compared to estimates in Table 5. Under extensive management, gains would be 13 kg. up to 3-6 months of age, 17 kg. to 1 year, 27 kg. to 2 years, 38 kg. to 3 years, and 40 kg. to 4-5 years. The estimated average daily rate of gain of .16 kg. for sheep in the feedlot can be compared to .12 kg. for 3-6 month old lambs, .07 kg. for sheep 1 year old, .04 kg. for sheep 2 years old, and .02 kg. for sheep up to 4-5 years of age under extensive programs.

Although this information provides only estimates considered to apply to general conditions in Somalia, it demonstrates the advantages that dryland farmers would have if they removed their sheep from the range for market at a young age. It also demonstrates that sheep can be grown and finished for market more efficiently under semi-intensive management conditions than under extensive conditions.

The situation for goats is similar to that described for sheep. However, goats are relatively less efficient than sheep in the feedlot, but are better adapted for utilizing rougher forages.

These production values are only estimates. Actual values for Somalia are not available. (Research designed to answer some of these questions should be conducted.) Also, no single value can adequately represent all situations because of great variations in range and management conditions. Values used were based on information gathered on extensive sheep production in the U.S. and the Middle East. Other values are estimated from modified information based on semi-intensive production systems in the Middle East.

Conclusion

Dryland farmers should emphasize greater utilization of sheep, goats and poultry. Sheep and goats will provide the greatest economic returns. The order of meat choice in the Somali society is lamb, mutton, goat meat, beef and camel. Compared to cattle, sheep and goats have a greater return on net input, faster turnover of investment, lower risk, lower technical input requirements, and they have a greater foreign market potential. Placing more emphasis on sheep and goats as compared to cattle will result in a 163 percent increase in net income under present management systems. Improved livestock management of sheep and goats will result in a 150 to 200 percent increase in net income. Research will result in an additional 100 percent or more increase in net income utilizing techniques of selection, oubreeding and hybridization. Poultry production will be improved in a similar manner.

ANNEX X

GROUNDWATER ANALYSIS

Groundwater

General Geology

The geology of the Bay Region is dominated by two geological units: the basement complex and the Jurassic Limestone Formation. The former occurs in a large outcrop in the south of the Project area and is overlain unconformably by the Jurassic Formation which underlies the northern part of the Region.

(see Map 1). The limestone forms a prominent escarpment (the Baidoa Escarpment) in the central part of the area. This fades into more subdued topography to the west and east. The only other formation of significance are the wadi alluvials found in the channels of the drainage system on the Basement Complex.

The Basement Complex comprises a suite of ancient crystalline igneous and metamorphic rocks such as granites, gneisses and schists. Those strata are highly deformed and faulted. Near ground surface there is a zone of weathering of variable thickness, where the parent rock has been decomposed into largely clay and silty debris. Physiographically, the basement complex outcrop is a flat featureless peneplain, sometimes dramatically interrupted by spectacular inselbergs (or burs). The elevation of the peneplain is about 300 metres above sea level and it has a general slope towards the south at gradients of about 5 m per km or less.

The Jurassic Limestone is an extensive, predominantly calcareous formation, comprising the following units:

- the Uegit Suite - coralline limestone and calcarenite
- the Anole Suite - clastic limestones with marl and calcareous clay
- the Iscia Baidoa Suite - sandstones shales, conglomerates, limestones, marls and detrital limestones.

The total thickness of this whole sequence is at least 900 m. The lithology of the Iscia Baidoa Suite on the Baidoa Escarpment include layers of very hard massive limestone as well as soft chalky limestone, marl and clay. The hard limestone layers are very common and are always encountered in digging wells. The whole of the Jurassic succession has a general westerly and north-westerly dip. Over most of the Project area, these strata are almost flat and undisturbed except in the extreme east where contorted bedding can be seen on the ERTS imagery. Outside the Bay Region, the degree of deformation increases with relatively steep folding, particularly in the north-west, near the Ethiopian border. Within the Project area, the limestone outcrop forms two distinct physiographic units: the Baidoa Plateau and the Limestone Depression. The former is a flat featureless plain generally at elevations of more than 400 m above median sea level. It slopes gently towards the east and west from a low central ridge stretching northwards from Baidoa. Just to the south of Baidoa, the limestone outcrop forms a steep escarpment almost 100 meters high. The Limestone Depression is an area at the base of the escarpment, togographically level with the basement complex, underlain by the Jurassic Limestone Formation. It is a low, gently undulating plain, in places gulleyed by run-off from the escarpment. The limestone outcrop has not been mapped and the full extent and thickness of the formation are not known.

The Basement Complex rocks are basically impermeable and non-porous; groundwater in exploitable quantities is normally found only in joints and fractures and in the weathered zone. In the Bay Region, the zone of weathering is normally thin (as shown by the recent mineral resources survey, which drilled 24 boreholes in the area). Fractures and joints do exist and some of them can be mapped using air photography and satellite imagery. Thus groundwater in basement strata is normally found in small isolated pockets, separated from each other by impermeable rock. Even under most favorable conditions, the permeabilities (of fracture or weathered zones) are low and consequently basement wells, even if successful, normally produce low yields. The wadi alluvia of the major river beds are permeable and, if saturated, can yield water to wells. However, their geometry is not known, though there is some evidence that they are usually too thin to produce high yields of groundwater. Thus in terms of permeability and porosity, the groundwater resources of the Basement Complex do not appear promising. Groundwater quality data is equally discouraging. Idrotecneco (1976) in their inventory of basement wells, give the following data on groundwater salinity distribution:

No. of Wells	Electrical Conductivity Range (EC)
4	less than 1,000
7	1,000 - 3,000
12	3,000 - 5,000
14	5,000 - 10,000
4	greater than 10,000

As can be seen, most of this water is well outside the World Health Organization permissible limits for domestic consumption, though no doubt anything up to EC of 5,000 micromhos/cm is used for stock watering on occasions. FAO (1977) give some chemical analyses of water samples from basement wells (Table 1). The quality of these is better but most of them come from a relatively small area around Bur Akaba. Idrotecneco give only four salinities of groundwater from alluvial wells in the area. The quality is also poor with EC values ranging from 2,150 to 8,150 micromhos/cm. There appears to be no identifiable macro-pattern of groundwater quality distribution, reflecting the localized nature of aquifer occurrence. On the micro-scale, it might be expected that good quality water is more likely to occur under surface drainage channels than away from them. However, though this is certainly likely, there is no factual evidence to support it.

Depth to water table in the basement area is normally between 5 and 15 meters. Generally there is little seasonal fluctuation of the water reflecting the stagnant nature of the small, separate groundwater bodies. Recharge to the pockets of water bearing material in the basement rocks is from local sources and in most cases can be expected to be low. The main source is the infiltration of surface flows, where steams and rivers directly overflow pockets of permeable strata. Most favorable recharge conditions are at confluences of major drainage channels. It is not possible to quantify the recharge, even in most approximate terms. However, permanent depletion of the aquifers does not appear to be a serious danger with the low abstraction rates (by manual methods) practiced at present or planned for the future.

Limestone Plateau

The Jurassic Limestone Formation contains groundwater in porous and permeable layers within the succession. These may be of two kinds: Karst features (particularly near ground levels) and interstitial openings in chalky and detrital limestones. The sequence also contains impermeable (or more correctly, low permeability) layers, as witnessed by the occurence of perched water tables in places. In the plateau area, the extent of Karst and intergranular permeability is not accurately known. Prominent Karst features exist around Baidoa town. In fact, Baidoa water supply is derived from a water-filled cavern in a normally dry stream bed. Recently constructed drilled wells to the north and west of Baidoa appear to tap a regional aquifer probably of a granular nature, possibly with permeability enhanced by Karstification. No aquifer permeability and storage data and not even discharge - draw-down data for wells are available.

Groundwater quality is generally moderate to good. EC values recorded from wells and springs, mainly near the escarpment, range from about 1,500 to 3,000 micromhos/cm, or 900 to 2,000 parts per million of total dissolved solids. Water quality of the spring discharges along the escarpment tends to be rather better. Some typical analyses are given in Table 1. However, there is a record of at least one well (62 km north-west of Baidoa along the road to Luk) where poor quality water has reportedly led to abandonment of the well. Whether this is a local or regional effect is not known. It would appear likely that groundwater deteriorate down dip, that is to the north and east of the escarpment.

The regional water table near Baidoa is reported to be at about 70 meters depth. However, above that level there are many perched water bodies, some of them sufficiently extensive for the abstraction tapping them never to go dry. Recharge to the aquifer is mainly by direct infiltration of rainfall. Since practically no surface drainage exists on the plateau, the rainfall infiltrates where it falls. Most of it is held in field capacity and evaporated from the soil surface or evapotranspired by plants, but some percolates below the rooting depth of the various plants and eventually reaches the regional water table. This recharge is difficult to quantify. Taking a conservative figure of 5% of mean annual rainfall as reaching the aquifer, the average annual recharge over the whole of Limestone Plateau in the Bay Region is about 500 Mm^3 or 20,000 m^3 per km^2 per annum. In addition, there is probably an underflow from the Limestone Depression, towards the north under the plateau. Using hydrochemistry, FAO identified the limestone depression as a major intake area for the whole limestone basin. Most of the plateau area is the basin underflow or sub-artesian zone and the basin discharge zones correspond to gypsum and other salt deposits to the west and north of the Bay Region near the Ethiopian border. This hydrochemical interpretation of the flow system agrees well with that based on more general hydrogeological concepts. Thus the general flow pattern is from the Baidoa area towards the north and east, essentially down dip. However, this is locally reversed, at least in the case of the perched water bodies near the escarpment which feed the springs along the escarpment.

Limestone Depression

The Limestone Depression which may be a down-faulted block of the Jurassic Formation, contains rocks identical to those of the limestone plateau, but occupying a lower topographic position. Consequently, the water table is nearer the land surface, making groundwater development for irrigation a possibility. As already mentioned, the geometry of the aquifer in the depression is not known. Its real extent has not been mapped accurately but is estimated from the ERTS imagery at about 100,000 ha. The thickness of the limestone is not known, though FAO (1977) report the results of some resistivity probes indicating depths to basement of between 40 and 90 meters. The hydraulic properties of this aquifer are also not known. There are some near surface Karst features, some of which have been enlarged by digging and are pumped for irrigation. The Karst nature of the uppermost aquifer is supported by the reported very fast interference effects between adjacent wells. Thus, undoubtedly, high permeability exists at least locally near ground surface. However, it is not known whether the deeper layers are also permeable, though by analogy with the limestone plateau area, this is likely. FAO (1977) also report that the resistivity probes indicate deeper permeability.

Groundwater quality is generally good. Samples collected from springs and open wells in the area indicate salinities of mainly less than 1,500 parts per million of total dissolved solids which is equivalent to EC of about 2,300 micromhos/cm or less. Thus most of the water is suitable for domestic supply and all appear to be suitable for livestock watering. Since the water here is also considered for irrigation development, it was also viewed in terms of the salinity and sodicity classification. The calculated EC and SAR (sodium absorption ratio) for the available chemical analyses of samples from shallow wells are listed below:

Ref. No.	EC	SAR	Irrigation Class
37	990	1.0	$C_3 - S_1$
59	2,930	3.9	$C_4 - S_1$
60	2,340	3.9	$C_4 - S_1$
61	1,780	2.0	$C_3 - S_1$
62	1,690	2.7	$C_3 - S_1$
63	2,130	5.4	$C_3 - S_2$

Thus, most of the water would be classed as of high salinity hazard and low sodium hazard. With good management, it is good enough for irrigation of most crops.

Depth of water table is normally between 5 and 10 meters below ground level. Reportedly, there are considerable oscillations of the water levels between the dry and wet seasons, but these have not been systematically monitored. The Limestone Depression is advantageously placed from a recharge point of view. It is located in a high rainfall area; surface drainage is poorly developed; and it receives run-off of the limestone escarpment. FAO

estimate recharge at 200 mm per annum over the whole limestone outcrop, that is 200 Mm^3 per annum in total. They also estimate the storage coefficient at 20 percent and state that another 200 mm of water is available from every one meter of draw-down. Both these figures are thought to be much too high. It is most unlikely that recharge is equivalent to more than 1/3 of mean annual rainfall. Further, storage properties of Karst aquifers are usually an order lower than those quoted. Anyway, further studies are required before any credible recharge estimate can be produced.

Springs, Wells and Boreholes

Basement Complex

There are several hundreds of wells in the Basement Complex area, mainly dug by local farmers and livestock owners, though more recently a few drilled wells have been installed by the Government. Most of the wells are constructed entirely by manual methods. The greatest difficulty appears to be finding suitable sites for wells; when found, such sites often have 10 or more wells on them. Suitable areas for these clusters of wells are apparently located on the basis of vegetation and surface drainage conditions. Thus areas of decomposed basement are associated with particularly lush vegetation (deep soils) and good recharge conditions are related to proximity of wadi beds. The design of all these wells is normally the same. The cross-section is usually rectangular or square with sides of two or three meters. The depth is determined by the position of the water table; since no dewatering equipment is available during construction and no lining is used to support the well sides, penetration of only one or two meters below the water table is possible, even in highly stable material. The aquifer tapped by these wells is normally of low permeability and wells of large dimensions are necessary to produce a reasonable yield. Abstractions are always by bucket. In addition to these clusters of wells, which are in use throughout the year, there are some very low yielding single wells, which supply water only at the peak of the dry season, when all surface sources (small village ones) dry out. These are often small diameter (one meter or less), shallow and unlined and produce water of inferior quality. Sometimes they are several kilometers away from the villages which rely on them entirely for water supplies during the height of the dry seasons. All these dug wells are communally or privately owned and the owners draw their own water from them as and when they need it, without any charge. Apparently, some local people specialize in the construction and contract out as skilled labor. The total costs of a dug well depends on the depth but normally lies somewhere between So.Sh. 2,000 and 3,000.

Drilled wells in the basement are very few. Apparently, even after fracture analysis and geophysical survey, success ratio in basement drilling is no better than one in three. The wells are normally about 20 cm in diameter and depths are up to 60 meters. The method of drilling is mainly percussion and drilling time can be several months. Casing and screening is sometimes used. Pumping is by small turbines. The cost of such wells, fully

equipped, is reported at about So.Sh. 200,000. At present, the Hydrogeology Department of the Ministry of Mineral and Water Resources is planning a program of well construction in the basement area. Several wells are planned, sited on the basis of geophysical surveys. Drilling of the first well, near Dinsor, was expected to start in July, 1978.

Limestone Plateau

On the Limestone Plateau, there are both dug and drilled wells. The former tap various perched water bodies and the latter tap the limestone aquifer. The biggest concentration of large diameter, shallow (dug) wells is around Baidoa. Some of these take advantage of natural Karst features, while others have been excavated. Some are pumped with centrifugal pumps either for town water supply or for irrigation of small fruit and vegetable gardens. From others, groundwater is abstracted by bucket for domestic use or animal watering. The depth and size of these wells is extremely variable, from large holes (5 by 3 m meters), less than 5 meters deep to diameters of 1.5 m with water levels at 20 meters or more. All of these wells have been installed a long time ago and their construction costs are not known. The drilled wells are a recent innovation. Some 25 have been installed on the plateau in the Bay Region, mainly in the 1960's and 70's. Details of all these wells are given in Table 2. A typical example is shown in Figure 3. Most of the wells are between 70 and 120 meters deep and lined with 15 cm nominal diameter screen and casing. The pumps are turbines, driven either by diesel engines through vertical shafting or by submersible motors with small diesel generators near the well heads. In the case of shaft driven pumps, belt drive is used to transmit the power from the engine to the pump. In all such wells inspected, the alignment between the pump and engine was poor. Most of the engines and generators were of 15 hp capacity. The discharges of these wells are not measured accurately, but are reported to vary from 4,000 to 8,000 liters/hour. The draw-downs are apparently never measured. Hence the potential capacities of these wells are not known. Some of the wells have gone out of operation after a few years and some have never functioned satisfactorily. However, most of these problems can be expected to be remedied by sounder design and construction.

A fully equipped well, constructed by WDA, would cost between So.Sh. 250,000 and 350,000. Up to the end of 1977, the Ministry of Interior through the Regional Governor's office, has been responsible for levying water charges. These varied from one district to another. In the Bay Region, they were 10 cents per 5 sheep/goats or 3 cows or two camels. Water for human consumption is often free. In 1978, the operation and maintenance of all boreholes has been transferred to WDA, which is part of the Ministry of Mineral and Water Resources. Apparently the Ministry is now considering the level of water charges for well water which will be levied uniformly throughout Somalia.

The Escarpment and Limestone Depression

There are many springs issuing from the limestone escarpment. They are a major source of potable and livestock water in the Region. Most are small but some are estimated to yield in excess of 100,000 liters/hour. In

some cases, wells have been dug at or near the springs and are used for irrigation as well as for drinking. Water from these is lifted by bucket on a rope without any kind of leverage arrangement. At present, the irrigation is on a very small scale with individual wells irrigating about 0.1 to 0.2 ha of vegetables and fruit. These are either consumed locally or marketed in Baidoa. Rather surprisingly, the discharges of some of the larger springs is not used but runs to waste. At least in some cases, this water could be used for irrigation. In addition to the wells on the escarpment, which tap perched water bodies, there are some dug wells in the limestone depression. At least six of these, located just to the south of Baidoa, are equipped with engine driven pumps and are used for irrigation.

ANNEX XI

LINKAGES

The Bay Region depends for support and baseline studies on five other AID projects centered in and around the Bay Region; they are all carefully intertwined and the components of each contribute to the overall development of the Bay Region. The BRDP is a natural and necessary phase to the development of the agricultural sector in the most promising of all the regions in Somalia. Although this project concentrates on increasing grain and livestock production such development could not occur without the infrastructure, institutional support and training provided in the following projects:

1. Extension and Training Project 649-0101.

This three-year immediate impact production is currently staffed by a four person PASA / USDA team. Eight technical assistants will ultimately be engaged in developing the Agricultural Training Center at Bonka, providing on-farm experience and training for the 16 extension agents located in the Bay Region, and developing technical packages for crop and livestock production. The project will set up 62 demonstration plots to test maize and sorgham production and develop a minimun input pesticide package for seed preservation. The team includes 2 extension specialists, 3 agronomists, an animal husbandry specialist and a seed and a plant protection specialist. The information currently being collected and studies to be done will provide the basis for expansion of the technical packages under the Bay Region Project. Overlapping of the technical Assistance team from 0101 will ensure a continuity of technical expertise between the projects. The BRDP will build on the staff, experience and farmer and government contacts which are currently being extablished in the Baidoa area and four putlying districts. In addition, staff housing which oftentimes is a limiting factor to project initiation, will be availible from the 0101 project. This will reduce construction delays and ensure that the first team members will have housing, contacts, research to build upon, a center (Bonka) for training and equipment repair, and a productive working relationship with the Bay Region government officials. Normally this situation would take a few years to develop, however , by dovetailing one project into another the BRDP should get off to an early and rapid start.

2. The Central Rangelands Project 649-0108.

The goal of the Central Rangelands Project is to implement a system of range management that increases income, while preserving the range resources. Specifically, the project will provide staff, equipment, housing and transport to carry out range development, non-formal training, rangeland studies and trials and strengthen the National Range Agency.

The non-formal training will provide field experience for the upgrading of field staff and the initial on-the-job training of range assistants. The formal training will be accomplished with the assistance of four lecturers for courses in animal production, range and forestry at the technical level and one university lecturer in range management for the Faculty of Agriculture at Afgoi. Twenty person years of overseas study will be provided for students in range management and related fields.

The NRA will be provided 15.5 py of professional services to strenghten senior technical management and 4 py of professional services to establish range monitoring units.

The BRDP is dependent on this project to provide baseline range data and to supply trained staff to oversee the management and NRA staff of the water and range components of the PADU's. As watering points are developed, range monitoring will become increasingly important to prevent overgrazing and to assure that no conflicts develop between settled farmers who own stock and the Nomadic population. The NRA will provide agents to the BRDP who will enforce National Range Policy in the Bay Region.

3. Agricultural Delivery Systems 649-0112.

This project is an institution-building project aimed at producing trained extension agents and farm managers. The project will start up in September 1980 with team selection and upgrading the Farm Management Training Center at Afgoi. Facilities at Bonka and Jannale will be renovated as training centers for extension agents under the project. The technical assistance team funded by by AID will include an Agricultural Extension Specialist, a farm Management Advisor, Communication Specialist, an Animal Husbandry Specialist, an Agricultural Engineer, a Master Mechanic, and two Specialists in crop production.

The BRDP will draw five formally trained extension agents from this project per year beginning in 1984 when the first formally trained graduates are availible. A total of 120 FEAs will be utilized in the Bay Region. In addition, farm managers needed for Bonka and the Seed Farm will be drawn from graduates of the Farm Management course. The BRDP will continue the training of FEAs currently working in the Bay Region under project 0101 until formally trained agents are graduated. Training for the agricultural staff will involve both on the job experience and a series of updating courses at the facilities established under this project.

Staff from the 0112 project will be conducting research trials in both crop and animal production. Much of the information gained will be directly applicable to Bay Region production.

4. Rural Health Deli ery 649-0102;

Activities under this projedt are aimed at providing preventative health care to settled and nomadic rural areas. The project will begin in the Bay Region with the construction of the

public health center, 16 primary health care units and 4 district health centers. In addition, 2 public health nurse educators, 2 nurse midwives, 2 epidemologists and one sanitarian will be provided in the Bay Region as the US technical assistance component. As a preliminary survey for this project the University of North Carolina is conducting a Birth and Death Data Collection Project. The results of this demographic survey (to be completed in 1980) will include not only vital statistics, but the survey will delve into the relationship between various socia-economic factors and fertility. The information collected will be invaluable for long-range planning in the Bay Region. The BRDP has the flexibility to incorporate data collected in these preliminary studies into the development of the PADUs.

5. Comprehensive Groundwater Project 649-0104.

Under the BRDP, 100 wells will be drilled; equipment, technical assistance and drilling rigs will be supplied under 0104. The water components of the project are essential for the development of the Bay Region to reduce the present migratory production practices and to increase the hectares accessible for cultivation.

The Groundwater Project is aimed at strenthening the institutional capability of the Water Development Agency and assisting the Somali Government in developing an overall water resource program. Wells to be drilled under the BRDP will provide training and experience for Somali staff, produce valuable data for the Water Development Agency and develop new sources of water for farmers and livestock. The Groundwater Project aims to have a team in Baidoa by the end of 1980. The drilling team, to be stationed in Baidoa will be comprised of a mechanic, a driller, an electrician, and a geophysical technician funded under 0104. Housing for the staff will also be provided under the Groundwater Project and will be built by a local construction firm.

The initial year of the project will be essentially exploratory; drilling rigs will arrive in year 2 of the project and two of the five rigs will be assigned to the Bay Region. Equipment for wells in the Bay Region such as screens, casings and pumps will be funded under BRDP.

The water quality lab in Mogadishu will be upgraded under the Groundwater Project. The lab will receive both technical assistance and $137,000 worth of lab equipment; this will ensure that a potable water system is maintained in all regions.

Bay Region Development Project

Technical Assistance

Skill	Years	Financing	Location
Project Technical Manager	6	IDA/IFAD	Baidoa
Financial Controller	6	IDA/IFAD	Baidoa
Extension Specialist	5.5	AID	Baidoa
Ag Research Officer	5 .5	AID	Baidoa
Seed Farm Manager	5 .5	AID	Baidoa
Range Management Officer	5 .5	AID	Baidoa
Veterinary	5.5	AID	Baidoa
Hydrology Tech	5.5	AID	Baidoa
Water Engineer (shared)	4	AID	Mogadishu
Chief driller	5	AID	Baidoa
Mechanic	4.5	AID	Baidoa
Electrician (Puma)	4	AID	Baidoa
Highway Engineer	5.5	IDA/IFAD	Baidoa
Plant Superintendent	5	IDA/IFAD	Baidoa
Mech. Engineer	5.5	IDA/IFAD	Baidoa
Mech. Superintendent	5	IDA/IFAD	Baidoa
Evaluation Officer	4	IDA/IFAD	Mogadishu
Sociologist	4	IDA/IFAD	Mogadishu
Statistician/Econ	4	IDA/IFAD	Mogadishu

ANNEX XII

ECONOMIC ANALYSIS

BAY REGION DEVELOPMENT

Measurable Costs and Returns

Measuring costs and returns for extension projects and research programs can only be approximate. This is so for two reasons:

1. The estimates are made for future years.

2. Three assumptions must become facts in future years.

   a. Extension programs or research will produce the changes anticipated.

   b. Farmers will adopt changes recommended by graduates of the FMETC or the technology released from research.

   c. Prices in the future will in fact be those used in the analysis.

With the above suppositions, using professional insights make it possible to set some realistic bounds around the single valued estimates used in the analysis, thereby minimizing the error that will develop between estimate and fact as the years pass. With this in mind, the figures in the following analysis should be read plus or minus 15-20 percent. And, analyses should be revised often throughout the projected period.

Innovation Schedule

A time period of 20 years for the economic analysis is recommended even though the first phase of the project is only for five years. In the first year after project begins, the extension program will reach about three percent of the small farm farmers in the region and about the same percentage of new farmers each year through year 8, Table 9.

After the first eight years, about 20 percent of the farmers may be changing management practices for the better one way or another.

Table 9. Innovation Schedule Suggested

Code Year	Percent of Farms Inf.	Number of Farms/Year	Accumulative Total Farms Influenced*
0 Base	0	0	0
1	2.5	1200	1600
2	2.5	1200	2400
3	2.5	1200	3600
4	2.5	1200	4800
5	2.5	1200	6000
6	3	1500	1500
7	3	1500	9000
8	3	1500	10500
9	4	2000	12500
10	4	2000	14500
11	6	3000	17500
12	6	3000	20500
13	6	3000	23500
14	6	3000	26500
15	6	3000	29000
16	6	3000	32000
17	6	3000	35000
18	6	3000	38000
19	6	3000	41000
20	6	3000	44000

* If there are 50,000 rainfed farms of 5 hectares each, no more than 90 percent will ever be reached.

For the next six years extension agents may reach an average of about 5 percent of the farmers each year who will begin to innovate in some way. The first 25 percent will be in the second or third stage of applying new but appropriate technology. After 14 years about 55 percent of the farmers will be using innovations in their management practices. For the next six years the extension agents will bring about management changes on an additional 6 percent of the small farms per year. The first 25 percent will be in the third, fourth or fifth stage of management change; the second 30 percent will be in the second, third or fourth stage. At year 20 about 90 percent of small farmers will be innovating on their farms in one way or another. That is the most that will ever be affected.

The economic analysis will be based on changes in yields that will take place during each of five innovative periods. Under the most optimistic assumptions, during the first five years, they will increase about 100 percent over base year yields. During the second stage of five years, they will increase about 100 percent over base year yields. During the second stage of five years, they will increase another 75 percent over the base year. During the third stage of four years, they will increase another 60 percent over the base year. During the fourth stage of three years, they will increase another 40 percent over the base year. During the fifth stage of three years, they will increase 25 percent more over the base year. Over 20 years yields of

crops and livestock will increase about 300 percent over base year yields with a minimum of capital investment required. After 20 years innovating farmers should be prepared to accumulate resources under cooperative or corporation farming systems so modern technology can be used. They will then realize another big jump in yields and efficiency.

Composite Crop Farm Analysis

The project will utilize agents for some time in the future. One year after the first agents begin, some farms should be innovating at stage 1 level which will cause yields to increase. The process will continue until innovation stages become shorter because fear of change will decrease. Over the 20 year period crop yields could change as much as 300 percent with a minimum of capital expenditure, Table 10.

As time passes, through innovative stages under the extension program, technology will be substituted for labor. In the fifth stage a family will be able to farm twice as much land as in the base year. Therefore, total crop production will increase not only because of higher yields per hectare, but because of an increase in hectares, Table 11.

Since land is available in rainfed areas, there should be no problem in expanding farm size as indicated. Little capital would be needed. In fact, clearing land is a good way to convert labor to capital. If brush is removed and trees and shrubs are cut about a meter from the ground, clearing a hectare would take a crew of five

Table 10. Changes in Yields Over Innovation Stages

Years Innovation Stages	Yields Percent Inc./Yr.	Years Per Stage	Total Percent Increase
0 Base	0	0	0
1-5	20.0	5	100
6-10	15.0	5	75
11-14	15.0	4	60
15-17	13.3	3	40
18-20	8.4	3	25

Table 11. Changes in Farm Size Over Innovation Stages

Years Innovation Stages	Farm Size (has.)
0 Base	5
1-5	6
6-10	7
11-14	8
15-17	9
18-20	10

people about 15 days. Working at a rate of four So. Sh. a day would put the equivalent of 300 Sh. into a hectare for the cutting. Later when the stumps rot and are removed another 300 Sh. would be put into a hectare. Thus, 600 Sh. of family labor would be turned to capital. This gives the basis for placing a value on the land. Using an interest rate of 15 percent provides an estimate of annual interest costs of 90 Sh. per hectare, Table 12.

Four crops will be grown on the composite crop farm -- sorghum, cowpeas, sesame, and aftermath. Sorghum and cowpeas will be grown on the same land each year. A crop hectarage schedule by innovation stages is needed, Table 13.

Real crop production prices will undoubtedly increase over a 20 year period as the program influences product quality and marketing practices, Table 14.

If all the information in the following Tables along with base year yields are put together, a composite flow for 20 years can be presented including changes in yields, total production, prices, gross returns and annual increments in production and returns, Tables 15 through 18.

Using information from the Tables and from other sources, it is possible to construct a composite crop farm for the base year and follow it through each of the innovation stages, Table 19.

The most conservative estimates of innovation and the effects on yields indicate a yield increase in Sorghum of 8 percent in the first innovation cycle. Ten percent in the next innovation cycle

rising to an average increase of only 40 percent using the minimum package over 20 years. The rise of higher level technical packages would give a 100 percent increase in yield. See Tables A and B for a summary of the minimum projection.

The minimum projections give an increase in net returns per farm of approximately 50 percent over the present returns. See summary below.

Area	With Proj.	Without Proj.
Sorghum	5	4
Pulses	5	4
Yield kg/ha		
Sorghum	500	375
Pulses	100	70
Production kg		
Sorghum	2,500	1,500
Pulses	500	280
Value of Production		
Sorghum	2,500	1,500
Pulses	1,000	560
Total	3,500	2,060
Cost of Production	500	200
Net returns per farm	3,000	1,860
Net returns/ha.	600	465

Composite Livestock Unit Analysis

It is impractical to leave livestock out of the report just because they are not included in the MOA package. Farmers raise

SOMALIA

TABLE A

BAY REGION AGRICULTURAL DEVELOPMENT PROJECT

Project Benefits

Incremental Sorghum Availability

Year	(1) Simple Improved Practices ('000Ha) From Previously Cropped Area	(2) From Increased Cropped Area	(3) Total Area (1/2)	(4) Incremental Yield From Simple Improved Practices (kg/ha)	(5) Incremental Availability From Simple Improved Practices (tons) (4 x 5)	(6) Area Under Marketed Inputs '000 ha/	(7) Incremental Yield From Marketed Inputs (kg/ha)	(8) Incremental Availability From Marketed Inputs (tons) (7 x 8)	(9) Basic Output From New Cropped Area (tons) (2 x .375)	(10) Total Incremental Availability (tons) (6/9/10)
1	-	-	-	-	-	-	-	-	-	-
2	7	-	7	25	175	-	-	-	-	175
3	14	-	14	25	350	-	-	-	-	350
4	22	1	23	25	575	-	-	-	375	950
5	29	2	31	25	775	-	-	-	750	1,525
6	36	3	39	25	975	-	-	-	1,125	2,100
7	43	4	47	50	2,350	-	-	-	1,500	3,850
8	50	5	55	50	2,750	10	150	1,500	1,875	6,125
9	62	7	69	50	3,450	14	180	22,520	2,625	8,595
10	74	9	83	50	4,150	18	200	3,600	3,375	11,125
11	86	10	96	50	4,800	20	220	4,400	3,375	12,575
12	98	12	110	75	8,250	24	240	5,760	4,500	18,510
13	110	13	123	75	9,225	26	260	6,760	4,875	20,860
14	127	15	142	100	14,200	30	280	8,400	5,625	28,225
15	144	17	161	100	16,100	34	300	10,200	6,375	32,675
16	161	19	180	100	18,000	38	300	11,400	7,125	36,525
17	178	21	199	125	24,875	42	300	12,600	7,875	45,350
18	194	23	217	125	27,125	46	300	13,800	8,625	49,550
19	211	25	236	125	29,500	50	300	15,000	9,375	53,875
20	228	27	255	125	31,875	54	300	16,200	10,125	58,200

SOMALIA

TABLE B

BAY REGION AGRICULTURAL DEVELOPMENT PROJECT

Project Benefits

Incremental Pulse Availability

Year	Total Area Under Single Practices	Incremental Yield (kg/ha)	Incremental Production (tons) (1 x 2)	Total Area Under Modern Inputs	Incremental Yield (kg/ha)	Incremental Production (tons) (4 x 5)	Basic Output From New Cropped Areas (tons) (2 above x 70 kg)	Total Incremental Production (3&6/7)
1	-	-	-	-	-	-	-	-
2	7	10	70	-	-	-	-	70
3	14	10	140	-	-	-	-	140
4	23	10	230	-	-	-	70	300
5	31	10	310	-	-	-	140	450
6	39	10	390	-	-	-	210	600
7	47	20	940	-	-	-	280	1,220
8	55	20	1,100	10	50	500	350	1,950
9	69	20	1,380	14	60	840	490	2,710
10	83	20	1,660	18	70	1,260	630	3,550
11	96	20	1,920	20	80	1,600	700	4,220
12	110	30	3,300	24	80	1,920	840	6,060
13	123	30	3,690	26	80	2,080	910	6,680
14	142	30	4,260	30	80	2,400	1,050	7,710
15	161	30	4,830	34	80	2,720	1,190	8,740
16	180	30	5,400	38	80	3,040	1,330	9,770
17	199	30	5,970	42	80	3,360	1,470	10,800
18	217	30	6,510	46	80	3,680	1,610	11,800
19	236	30	7,080	50	80	4,000	1,750	12,830
20	255	30	7,650	54	80	4,320	1,890	13,860

Table 12. Investment in Land and Annual Interest Costs

Years Innov. Stages	Farm Size	Land Value	Interest Costs at 15%
		So. Sh.	So. Sh.
0	5	3,000	450
1-5	6	3,600	540
6-10	7	4,200	630
11-14	8	4,800	720
15-17	9	5,400	810
18-20	10	6,000	900

Table 13. Crops and Hectarages Over Innovation Stages

Years Innov. Stages	Hectares			
	Sorghum	Cowpeas	Sesame	Aftermath
0	4	4	1	5
1-5	5	5	1	6
6-10	6	6	1	7
11-14	7	7	1	8
15-17	7	7	2	9
18-20	8	8	2	10

Table 14. Crop Product Prices Over Innovation Stages

Years Innov. Stages	Prices Per Kg.			
	Sorghum	Cowpeas	Sesame	Aftermath/ha.
			So. Sh.	
0 Base	.75	1.50	2.50	120
1-5	.80	1.55	2.55	130
6-10	.85	1.60	2.60	140
11-14	.90	1.65	2.65	150
15-17	1.00	1.70	2.70	160
18-20	1.00	1.70	2.70	160

Table 15. Sorghum: Production, Gross Return, and Changes

Year	Yield Per Ha.	Total Production	Price Per Kg.	Total Returns	Change In Prod.	Change In Returns
	Kg.	Kg.	So. Sh.		Kg.	So. Sh.
0	353	1412	.75	1059	0	0
1	423	2115	.80	1692	703	633
2	493	2465	.80	1972	1053	913
3	563	2815	.80	2252	1403	1193
4	633	3165	.80	2532	1753	1473
5	703	3515	.80	2812	2103	1753
6	756	4536	.85	3856	3124	2797
7	809	4854	.85	4126	3442	3067
8	862	5172	.85	4396	3760	3337
9	915	5490	.85	4666	4078	3607
10	968	5808	.85	4937	4396	3878
11	1021	6126	.90	5513	4714	4454
12	1074	6444	.90	5800	5032	
13	1127	6762	.90	6086	5350	5027
14	1180	7080	.90	6372	5668	5313
15	1227	8589	1.00	8589	7177	7530
16	1274	8918	1.00	8918	7506	7859
17	1321	9247	1.00	9247	7835	8188
18	1351	10808	1.00	10808	9396	9749
19	1381	11048	1.00	11048	9636	9989
20	1411	11288	1.00	11288	9876	10229

Table 16. Cowpeas: Production, Gross Returns, and Changes

Year	Yield Per Ha.	Total Production	Price Per Kg	Total Returns	Change In Prod.	Change In Returns
	Kg	Kg	So. Sh.		Kg	So. Sh.
0	70	280	1.50	420	0	0
1	84	420	1.55	651	140	231
2	98	490	1.55	759	210	339
3	112	560	1.55	868	280	448
4	126	630	1.55	996	350	556
5	140	700	1.55	1085	420	665
6	150	900	1.60	1440	620	1020
7	160	960	1.60	1536	680	1116
8	170	1020	1.60	1632	740	1212
9	180	1080	1.60	1728	800	1308
10	190	1140	1.60	1824	860	1404
11	200	1400	1.65	2310	1120	1890
12	210	1470	1.65	2425	1190	2005
13	220	1540	1.65	2541	1260	2121
14	230	1610	1.65	2656	1330	2236
15	239	1673	1.70	2844	1393	2424
16	248	1736	1.70	2951	1456	2531
17	257	1799	1.70	3058	1519	2638
18	263	2104	1.70	3577	1824	3157
19	269	2152	1.70	3658	1872	3238
20	275	2200	1.70	3740	1920	3320

Table 17. Sesame: Production, Gross Returns, and Changes

Year	Yield Per Ha.	Total Production	Price Per Kg.	Total Returns	Change In Prod.	Change In Returns
	Kg	Kg	So. Sh.		Kg.	So. Sh.
0	378	378	2.50	945	0	0
1	454	454	2.55	1158	76	213
2	538	538	2.55	1372	160	427
3	606	606	2.55	1545	228	600
4	682	682	2.55	1739	304	794
5	758	750	2.55	1933	380	988
6	815	815	2.60	2119	437	1174
7	872	872	2.60	2267	494	1322
8	929	929	2.60	2415	551	1470
9	986	986	2.60	2564	608	1619
10	1043	1041	2.60	2712	665	1767
11	1100	1100	2.65	2915	722	1970
12	1157	1157	2.65	3066	779	2121
13	1214	1214	2.65	3217	836	2272
14	1267	1267	2.65	3358	889	2413
15	1321	2642	2.70	7133	2264	6188
16	1371	2742	2.70	7403	2364	6458
17	1421	2842	2.70	7673	2464	6728
18	1453	2906	2.70	7846	2528	6901
19	1485	2970	2.70	8019	2592	7074
20	1517	3034	2.70	8192	2656	7247

Table 18. Aftermath Grazing: Hectares, Gross Returns, Changes

Year	Total Hectares	Price Per Ha	Total Returns	Change In Ha.	Change In Returns
		So. Sh.			So. Sh.
0	5	120	600	-	0
1	6	130	780	1	180
2	6	130	780	-	180
3	6	130	780	-	180
4	6	130	780	-	180
5	6	130	780	-	180
6	7	150	1050	1	450
7	7	150	1050	-	450
8	7	150	1050	-	450
9	7	150	1050	-	450
10	7	150	1050	-	450
11	8	180	1440	1	840
12	8	180	1440	-	840
13	8	180	1440	-	840
14	8	180	1440	-	840
15	9	210	1890	1	1290
16	9	210	1890	-	1290
17	9	210	1890	-	1290
18	10	250	2500	1	1900
19	10	250	2500	-	1900
20	10	250	2500	-	1900

Table 19. Summary: Net Returns Estimates for Composite Crop Farms Over Time

Item	Farm At Year 0	5	10	14	17	20
Cropped Area, Ha.[1]						
Sorghum[2]	4	5	6	7	7	8
Cowpeas[3]	4	5	6	7	7	8
Sesame	1	1	1	1	2	2
Aftermath	5	6	7	8	9	10
Total	5	6	7	8	9	10
Yields						
Sorghum, kg/ha	353	703	968	1180	1321	1411
Cowpeas "	70	140	190	230	257	275
Sesame "	378	758	1043	1267	1421	1517
Aftermath, months	3	3	3	3	3	3
Prices						
Sorghum (Sh./kg)	.75	.80	.85	.90	1.00	1.00
Cowpeas "	1.50	1.55	1.60	1.65	1.70	1.70
Sesame "	2.50	2.55	2.60	2.65	2.70	2.70
Aftermath(Sh./ha)	120	130	150	180	210	250
Value of Production						
Sorghum So. Sh.	1059	[illegible]	4973	6372	9241	11288
Cowpeas "	420	1085	1824	2656	3058	3740
Sesame "	945	1933	2712	3358	7673	8190
Aftermath "	600	780	1050	1440	1890	2500
Total	3024	6610	10523	13826	21862	25720
Costs of Production						
Investment Costs	550[5]	740[6]	900[7]	1200[8]	2000[9]	3000[10]
Operating Costs	200[11]	300[12]	500[13]	750[14]	1050[15]	1450[16]
Total	750	1040	1400	1950	3050	4450
Net Returns	2274	5570	9123	11876	18812	21270
Family Labor[17]	468	468	468	468	468	468
Net Returns/Ha.	455	928	1303	1484	2090	2127
Net Returns/MD	4,9	11.9	19.5	25.4	40.2	45.5

Table 19 (cont.)

1/ Total Area Cropped.

2/ Double Cropped with sorghum.

3/ Harvest fodder and 3 months a year grazing.

4/ Value of harvested fodder and 3 months a year grazing.

5/ Interest on land value, and hand tools depreciated over 2 years, no salvage value.

6/ Same as 5/ plus some metal hand tools depreciate over 3 years, no salvage value.

7/ Same as 6/ plus oxen power depreciated over 4 years, salvage value as meat. More complex wood and metal walking equipment.

8/ Same as 7/ plus small power motor with walking equipment depreciated over 4 years, limited salvage value. Some beasts of burden depreciated over 5 years, no salvage value.

9/ Same as 8/ plus wagons, simple planting and harvesting equipment and 2 teams of oxen all depreciated over 5 years, limited salvage value.

10/ Same as 9/ plus water and storage facilities, sheds, etc. depreciated over 10 years, limited salvage value.

11/ Seed, minor repairs, interest, etc.

12/ Same plus insecticides, etc.

13/ Same plus feed, higher maintenance costs, etc.

14/ Same plus fuel, part, oil, higher maintenance costs.

15/ Same plus improved seed, limited fertilizer, quality control, etc.

16/ Same plus higher maintenance cost, more fertilizer, marketing cost.

17/ The equivalent of 3 adults for 26 days per month for 6 months. Technology is substituted for labor so no additional labor is needed.

livestock in conjunction with crops here just as every place else in the world. Extension agents will need to teach farmers livestock management along with crop management. The extension program should provide training in livestock management as forcefully as it does for crops. Economically speaking crops and livestock are often complimentary in the Somali environment.

Composite livestock units to be built and analyzed here require similar information as needed for crop farms. They were done independently so that they could be combined (or not combined) in any combination desired. Only cattle, sheep and goats are included here. Camels are left to nonfarm herdsmen. They are important in Somalia agriculture but are not ideal type farm animals.

Prices will change from the base year to year 20. Allowing for conservative changes is better than allowing none at all. Table 20.

It will be useful to know at what rates cattle, sheep and goats substitute for each other. One decision farm managers and extension staff will need to make concerns the combination of types of animals in the herd. The prices for year zero in Table 20 indicate that sheep may be a more feasible animal than cattle, Table 21.

With animals substituting for each other as in Table 21, a shift toward more sheep and fewer cattle is indicated, Table 22 and Table 23.

Table 21. Physical and Economic Relations Among Cattle, Goats and Sheep

Animal	Animal Unit Ratios	Relationships	
		No. Animals/AU	Value/AU
Cattle	1.00	1.0	1900
Goats	.10	10.0	3500
Sheep	.10	10.0	5000

Table 22. Herd Size and Composition, Year 0

Animals	Percent AU's	Composition					
		Size 1		Size 2		Size 3	
		AU's	No.	AU's	No.	AU's	No.
Cattle	92	11.0	11	27.0	27	55.0	55
Goats	5	.6	6	1.5	15	3.0	30
Sheep	3	.3	3	.8	8	1.5	15
Total	100	11.9	20	29.3	50	59.5	100

Table 23. Herd Size and Composition, Year 20

Animals	Percent AU's	Composition					
		Size 1		Size 2		Size 3	
		AU's	No.	AU's	No.	AU's	No.
Cattle	60	7.0	7	17.0	17	33.0	33
Goats	5	.6	6	1.5	15	3.0	30
Sheep	35	4.3	43	10.8	108	23.5	235
Total	100	11.9	56	29.3	140	59.5	298

However, in order to reduce risk and uncertainty, the small farm herd should include some of all three types.

A change in herd composition will not take place immediately. FMETC graduates and others will have to demonstrate the feasibility of such changes. However, the change flow might be as in Table 24.

In year zero the birth rate in all animals is about 34 percent. Of live births about 60 percent live to reach the market at about four or five years of age. With the help of FMETC graduates farmers can change the survival rate dramatically over 20 years as well as lower the age when animals are marketed, Table 25.

Using information provided in the preceding Tables, it is possible to estimate the number of animals that will go to market annually over time. Note that as market age shortens, there are some years in which more than one year's production is marketed, Table 26.

Now the flow of gross returns over time can be estimated for livestock sales, Table 27.

Summaries of physical and economic measures that take place for each herd size and for selected years emphasize the changes that are reasonable in small farm livestock production, Table 28, 29 and 30. Of course, these are only examples. Many combinations of livestock enterprises could develop over 20 years. As with the crop analysis, productivity and economic efficiency rise dramatically as appropriate and simple technology is introduced along the way.

Table 24. Herd Composition Change By Year

Year	Size 1-11.9 AU's			Size 2-29.3 AU's			Size 3-59.5 AU's		
	Cattle	Goats	Sheep	Cattle	Goats	Sheep	Cattle	Goats	Sheep
	Numbers of Animals								
0	11	6	3	27	15	8	55	30	15
1	11	6	3	26	15	18	53	30	35
2	11	6	3	26	15	18	53	30	35
3	11	6	3	26	15	18	53	30	35
4	11	6	3	26	15	18	53	30	35
5	11	6	3	26	15	18	53	30	35
6	10	6	13	24	15	38	48	30	85
7	10	6	13	25	15	38	48	30	85
8	10	6	13	25	15	38	48	30	85
9	10	6	13	25	15	38	48	30	85
10	10	6	13	25	15	38	48	30	85
11	9	6	23	21	15	68	40	30	165
12	9	6	23	21	15	68	40	30	165
13	9	6	23	21	15	68	40	30	165
14	9	6	23	21	15	68	40	30	165
15	8	6	33	19	15	88	36	30	205
16	8	6	33	19	15	88	36	30	205
17	8	6	33	19	15	88	36	30	205
18	7	6	43	17	15	108	33	30	235
19	7	6	43	17	15	108	33	30	235
20	7	6	43	17	15	108	33	30	235

Table 25. Changes in Survival Rates and Market Ages

Year	Survival to Market Rates(%)	Market Age (Years)		
		Cattle	Goats	Sheep
0	20	5	5	5
1	30	4	4	4
2	30	4	4	4
3	30	4	4	4
4	30	4	4	4
5	45	3	3	3
6	45	3	3	3
7	45	3	3	3
8	45	3	3	3
9	45	3	3	3
10	45	3	3	3
11	60	3	2	2
12	60	3	2	2
13	60	3	2	2
14	60	3	2	2
15	75	2	1	1
16	75	2	1	1
17	75	2	1	1
18	85	1.5	.5	.5
19	85	1.5	.5	.5
20	85	1.5	.5	.5

Table 26. Flow of Animals Marketed Over Time

Year	Size 1-11.9 AU's			Size 2-29.3 AU's			Size 3-59.5 AU's		
	Cattle	Goats	Sheep	Cattle	Goats	Sheep	Cattle	Goats	Sheep
	Numbers								
0	2	1	1	5	3	2	11	6	3
1	2	1	1	5	3	2	11	6	3
2	2	1	1	5	3	2	11	6	3
3	2	1	1	5	3	2	11	6	3
4	5	3	2	13	7	7	27	18	13
5	3	2	1	8	4	5	16	9	10
6	3	2	1	8	4	5	16	9	10
7	3	2	1	8	4	5	16	9	10
8	7	5	7	19	11	22	38	22	48
9	4	3	6	11	7	17	22	13	38
10	4	3	6	11	7	17	22	13	38
11	4	3	6	11	7	17	22	13	38
12	4	7	20	11	16	58	22	31	137
13	5	4	14	13	9	41	24	18	99
14	5	4	14	13	9	41	24	18	99
15	5	8	39	13	20	107	24	40	253
16	11	4	25	27	11	66	51	22	154
17	6	4	25	14	11	66	27	22	154
18	12	10	62	28	24	158	55	47	354
19	6	5	37	14	13	92	28	25	200
20	6	5	37	14	13	92	28	25	200

Table 27. Gross Returns from Livestock Sales Over Time

Year	Size 1-11.9 AU's			Size 2-29.3 AU's			Size 3-59.5 AU's		
	Cattle	Goats	Sheep	Cattle	Goats	Sheep	Cattle	Goats	Sheep
				(100 So. Sh.)					
0	38.0	3.5	5.0	95.0	10.5	10.0	209.0	21.0	15.0
1	38.0	3.5	5.0	95.0	10.5	10.0	209.0	21.0	15.0
2	38.2	3.6	5.1	95.5	10.8	10.2	210.0	21.6	15.3
3	38.4	3.7	5.2	96.0	11.1	10.4	211.2	22.2	15.6
4	96.5	11.4	10.6	250.9	26.6	37.1	521.1	57.0	69.9
5	58.2	7.8	5.4	155.2	15.6	21.6	310.4	35.1	54.0
6	58.5	8.0	5.5	156.0	16.0	27.5	312.0	56.0	55.0
7	58.8	8.2	5.6	156.8	16.5	28.0	313.6	36.9	56.0
8	137.9	20.0	39.9	374.3	44.0	125.4	748.6	88.0	273.6
9	79.2	12.0	34.8	217.8	28.0	98.6	435.6	52.0	220.4
10	79.6	12.0	35.4	218.9	28.0	100.3	437.8	52.0	224.2
11	80.0	12.0	36.0	220.0	28.0	102.0	440.0	52.0	228.0
12	80.0	28.0	120.0	220.0	64.0	348.0	440.0	124.0	822.0
13	100.0	16.0	84.0	260.0	36.0	246.0	480.0	72.0	594.0
14	100.0	16.0	84.0	260.0	36.0	246.0	480.0	72.0	594.0
15	100.0	32.0	234.0	260.0	80.0	642.0	480.0	160.0	918.0
16	220.0	16.0	150.0	260.0	44.0	396.0	1021.0	88.0	924.0
17	120.0	16.0	150.0	280.0	44.0	396.0	540.0	88.0	924.0
18	240.0	40.0	372.0	560.0	96.0	948.0	1100.0	188.0	2124.0
19	120.0	20.0	222.0	280.0	52.0	553.0	560.0	100.0	1524.0
20	120.0	20.0	222.0	280.0	52.0	552.0	560.0	100.0	1524.0

Table 28. Summary: Composite Livestock Herd, Size 1 (11.9 AU's)

Item	At Year: 0	5	10	14	17	20
			Numbers			
Herd Females						
Cattle	11	11	10	9	8	7
Goats	6	6	6	6	6	6
Sheep	3	3	13	23	33	43
Total	20	20	29	38	47	56
Animals Marketed						
Cattle	2	3	4	5	6	6
Goats	1	2	3	4	4	4
Sheep	11	1	6	14	25	37
Total	14	6	13	23	35	48
Prices Per Head			So. Sh.			
Cattle	1900	1940	1990	2000	2000	2000
Goats	350	390	400	400	400	400
Sheep	500	540	590	600	600	600
Value of Products						
Cattle	3800	5820	7960	10000	12000	12000
Goats	350	780	1200	1600	1600	2000
Sheep	500	540	3540	8400	15000	22200
Total	4650	7140	12700	20000	28600	36200
Costs of Production			So. Sh.			
Investment[1/]	2040	2110	2500	2850	3180	3520
Operating[2/]	500	1000	1500	2000	2500	3000
Total	2540	3110	4000	4850	5680	6520
Net Returns	2110	4030	8700	15150	22920	29680
Family Labor, Days[3/]	1095	1095	1095	1095	1095	1095
Net Returns/AU	177	339	731	1273	1926	2494
Net Returns/MD	1.9	3.7	8.0	13.8	20.9	27.1

[1/] Value of females in the herd divided by 2, depreciated over 6 years, additional facilities depreciated as technology changes, and 15 percent interest on the investment.

[2/] Includes aftermath grazing, other feed, control equipment, medicines, pesticides, etc.

[3/] Equivalent of 3 adults for 365 days a year.

Table 29. Summary: Composite Livestock Herd, Size 2(29.3 AU's)

Item	At Year: 0	5	10	14	17	20
			Numbers			
Herd Females						
Cattle	27	26	24	21	19	17
Goats	15	15	15	15	15	15
Sheep	8	18	38	68	88	108
Total	50	59	77	104	122	140
Animals Marketed			Numbers			
Cattle	5	8	11	13	14	15
Goats	3	4	7	9	11	13
Sheep	2	5	17	41	66	92
Prices			So. Sh./Head			
Cattle	1900	1940	1990	2000	2000	2000
Goats	450	390	400	400	400	400
Sheep	500	540	590	600	600	600
Value of Products			So. Sh.			
Cattle	9500	15520	21890	26000	28000	28000
Goats	1050	1560	2800	3600	4400	5200
Sheep	1000	2700	10030	24600	39600	55200
Total	11500	19780	34720	54200	72000	88400
Costs of Production			So. Sh.			
Investment[1/]	4610	1500	6380	7400	8070	8730
Operating Costs[2/]	1600	3000	3550	4000	6500	7000
Total	6210	8500	9900	11400	14570	15730
			So. Sh.			
Net Returns	5340	11280	24820	42800	57430	72670
Family Labor[3/]	1460	1460	1460	1460	1460	1460
Net Returns/AH	183	385	847	1460	1960	2480
Net Returns/MD	3.7	7.7	17.7	29.3	39.3	49.8

1/ See notes for previous Table.

2/ See notes for previous Table.

3/ Equivalent of 4 adults for 365 days a year with technology substitution for labor as development takes place.

Table 30. Summary: Composite Livestock Herd, Size 3(59.5 AU's)

Item	At Year 0	5	10	14	17	20
			Numbers			
Herd Females						
Cattle	55	53	48	40	36	33
Goats	30	30	30	30	30	30
Sheep	15	35	85	165	205	235
Total	100	118	163	235	271	298
Animals Marketed			Numbers			
Cattle	11	16	22	24	27	28
Goats	6	9	13	18	22	25
Sheep	3	10	38	99	154	200
Total	20	35	73	141	203	253
Prices			So. Sh./Head			
Cattle	1900	1940	1990	2000	2000	2000
Goats	350	390	400	400	400	400
Sheep	500	540	590	600	600	600
Value of Products			So. Sh.			
Cattle	20900	31040	43780	48000	54000	56000
Goats	2100	3510	5200	7200	8800	10000
Sheep	1500	5400	22420	59400	90000	120000
Total	[illegible]	39950	[illegible]	[illegible]	152800	18600
Costs of Production			So. Sh.			
Investment	10208	11118	13139	15917	17250	18250
Operating[2/]	2500	4500	6600	7500	8200	9000
Total	12708	15618	19739	23417	25450	27250
Net Returns	11792	24332	51661	91183	124443	158750
Family Labor[3/]	2190	2190	2190	2190	2190	2190
Net Returns/AU	198	409	868	1532	2140	2668
Net Returns/MD	5.4	11.1	23.6	41.6	58.2	72.5

1/ See previous Table.

2/ See previous Table.

3/ Equivalent of 6 adults for 365 days a year with technology substituting for labor as development takes place.

Economic Summary

The micro-economic analysis has been emphasized in this report because adequate macro-economic measures have been estimated by others. However, if an internal rate of return attributable to the influence of a successful FMETC program is desired, the flow of changes in the gross returns Tables multiplied by the number of farms and livestock operations can be estimated. Gross returns should be used because even the changes in costs of production from year 0 stimulate the economy.

Program costs for the FMETC can be spread over 20 years as has been done in other reports. Twenty years has been used because it is felt that a full generation will be needed to bring small farm and livestock managers to the verge of modern mechanized technology. It will take Somali government institutions, education, and small farm and market business managers 20 years to adjust so necessary supports for modern mechanized small-family-sized operations can develop into viable commercial units.

Most of the crop and livestock products discussed in this report are exportable, so increasing production of crops and livestock will have a beneficial effect upon the foreign exchange balance. Fear of depressed prices in the domestic market will, of course, depend upon government action, but exportable products should not feel strongly a let down in domestic demand if it should occur.

Down the road a way possibly near the end of the 20 year period, marketing improvements need to be introduced that will give family

farm managers an incentive to improve quality and productivity beyond the suggested changes in this report. Product grading, price differentiation by grade, price by weight for livestock, reduction of marketing waste in crops and livestock, refrigeration, motor transportation, improved country roads, market new information, etc., etc. are all possibilities. Bay Region project can initiate these programs at an appropriate time in the future.

Conclusions

The important conclusions after this brief study period are:

1. The natural resource potential for meeting Somalia's agricultural goals is here. Both crops and livestock production could increase several times with only small capital investment.

2. The level of human capital is a limiting factor to achieve self sufficiency, but the material to eliminate this shortage is in abundance among the Somali people.

3. Supporting government institutions are limiting at the present time, but again, Somalis with vision are beginning to remove these limitations.

4. An extension outreach program is a necessity in order to transfer information, management skills, and technology to the small farm and herd sector in agriculture.

5. There is considerable low cost technology available to increase dramatically agricultural productivity in Somalia.

6. Research should be applied and demonstration types. Also, some adaptation tests need to be made for imported or Somali developed technology.

ANNEX XIII

Social Soundness Considerations

A. THE BAY REGION: BACKGROUND

The Bay Region is one of sixteen (16) recently gazetted administrative regions of the Somali Democratic Republic (SDR). It is located in the "Inter-Riverine Area" between the Juba and Shabelli Rivers, approximately 200 km. (125 miles) west-northwest of Mogadishu, the capital of Somalia. Formerly part of the "Upper Juba Region," and in the early 1970's comprising a significantly larger geographic unit, it was re-designated and reduced in territorial size during the period 1978-79, in part to emphasize its development potential as a distinct "drylands, rain-fed, mixed farming" region in contrast to either irrigation or mainly livestock development areas that surround it.

Administrative and commercial headquarters for the region are located in the town of Baidoa (also labled "Baydhaba"), which earlier was also the name of the larger region from which the current Bay Region was formed. Baidoa is the largest town (over 20,000 persons) in the region and is easily accessible from Mogadishu in a three hrs./40 minutes drive along 250 km. (156 miles) of all-seasons tarmac road. It is a prosperous and growing regional capital that possesses numerous shops, a 125-bed hospital, the region's only secondary school (442 students), at least five small motels, over 15 taxis, and the Bonka Farmers' Training Center located only 4 km. north of the town. Indeed, the town is sub-divided into four wards or "quarters", with an estimated total of 6,000 family households, and 10 primary schools which provide four-years of"elementary" and two-years of "intermediate" education. It is also scheduled to house one of the two National Health Training Centers being provided under the USAID Rural Health Delivery Project No. 649-0102.

The Four Districts and Major Towns

The Bay Region is divided into four (4) districts,each named after major towns which form their district administrative headquarters (Map 1). These are: i) Baidoa town (over 20,000 persons); ii) Bur Acaba town (approx. 3,500); iii)Dinsoor town (about 4,000); and iv) Qansa Dhere town (2,000).

Except for the Baidoa and Bur Acaba Districts which are linked by the main tarmac road from Mogadishu, travel between the other districts (and travel within all four districts) is restricted to poorly constructed and maintained dirt roads or motor tracks, most of which are impassable for several weeks during the two rainy seasons. In dry weather, there are local daily bus services between Baidoa and Bur Acaba towns, and between Baidoa and Dinsoor towns. Qansa Dhere town is linked to both Baidoa and Dinsoor towns by bus service that runs only once every two or three days.

Other sizeable towns in the region include: Ufuro (4,500 persons) in Qansa Dhere District; Dusta (1,500) and Berdale (no data) in Baidoa District; and Bur Djibis and Bur Hibi (about 1,000 ea.) in Bur Acaba District. Dinsoor District is the largest and most remote of the four districts, possessing only one major town.

Administration

Each of the four districts is administered by a resident District Commissioner, under the leadership of a Regional Governor located in Baidoa Township who is also the Regional Secretary of the Somali Socialist Revolutionary Party (SSRP). Both the Governor and the District Commissioners are assisted in their work by Regional and District Directors of: a) the National Security Agency, and b) Regional Deputy or District Assistant SSRP Secretaries - all of whom are appointed, supervised and coordinated by a Regional Inspectorate consisting of high ranking officials (some military) who report to the SDR Head of State, President Mohamed Siyad Barre, formally via the Vice President for Presidential Affairs (See: I. M. Lewis, 1978 for more details). Though regional and district personnel of the various national ministries - such as MOA extension or MLFR veterinary officers - operate autonomously in their day-to-day activities, their actions are subject to the scrutiny and authority of these regional and district administrative officials.

Population

The 1975 SDR National Census lists the total human population of the region as 302,054 persons. Males were reported to number 157,104 and females 144,950. This significant difference in male/female ratios suggest that either a large number of nomadic herdsmen (some 12,000) were in the region from outside it at the time of the count or that the census was itself faulty, both of which are plausible hypotheses.

In 1978 the total was estimated to have increased to 350,000 persons, which is approximately 10% of the total national population of Somalia (World Bank Appraisal Report, 1979, p.3). Further breakdowns of the national census data by district have not been published. However, a 1979 SDR analysis of "family households" in the Bay Region, based upon the 1975 census, does provide useful demographic insights by district and in terms of "town/rural" households as follows:

Figure 1. Bay Region Households by District (1975)

	No. in Towns	(%)	No. of Rural	(%)	TOTAL	(%)
Baidoa District	7,688	(19%)	32,836	(81%)	40,544	(100%)
Bur Acaba District	831	(6%)	12,721	(94%)	13,552	(100%)
Dinsoor District	973	(13%)	6,457	(87%)	7,430	(100%)
Qansa Dhere District	412	(6%)	6,208	(94%)	6,620	(100%)
TOTAL REGION:	9,904		58,246		68,146	
%Town/Rural	(15%)		(85%)		(100%)	

Overall Average household size = 4.4 persons

By simple extrapolation, and assuming that the national annual population increase rate of 2.6% is applicable, the present-day 1980 population of the four districts in the Bay Region can be estimated as follows:

Figure 2. 1980 Bay Region Population by District (extrapolated from 1975 base data)

	Total No.	(%)
Baidoa District	202,615	(59%)
Bur Acaba District	68,683	(20%)
Dinsoor District	37,776	(11%)
Qansa Dhere District	34,341	(10%)
TOTAL REGION	343,415	(100%)

Several important observations follow from a consideration of these data:

1. Well over 50% of the total regional population is located in Baidoa District, which also possesses 78% of the total urban town population of the region. Thus, population density and existing district infrastructure are likely to be more highly developed in Baidoa than in the other three districts, a conclusion easily supported by even impressionistic observations of the region.

2. However, regional ADC data on purchases of sorghum from the four districts in 1979 and their projected quotas for 1980 (presented elsewhere in this report) suggest that Baidoa District is selling to ADC only 28-30% of the regional sorghum production, while Qansa Dhere - the smallest district with the lowest town/rural ratios and lowest total population (10%) of the region - is selling to ADC 52% of the total regional sorghum production. Though seasonal variations in rainfall between the districts, or the higher urban town population of Baidoa District which may drain sorghum exports from the region, or even faulty data can all be advanced as plausible explanations for this disparity, it does highlight an important area in population/agricultural production/sales activities of the region that deserves more study before detailed development strategies are decided upon among the four districts.

3. It may be noted that the total Bay Region population estimates made here for 1980 are substantially less than those reported by the IBRD Appraisal Report for 1978. The latter's projections would call for a total regional population of 363,436 by 1980, or 25,000 more persons (7.2%) than estimated here. Moreover, MOE data on the numbers of primary schools and students within the four districts (presented elsewhere in this report) tend to corroborate the pattern of population distribution within the four districts suggested here.

4. Finally, there is one anomaly in these population figures for the region that should be noted. The 1975 household analysis for Qansa Dhere District suggests a significantly lower town population at Ufaro and Qansa Dhere than those gathered by our team in 1980 - indeed, a 72% discrepancy. This suggests either faulty data on the town populations of Qansa Dhere District, or a substantial increase in townspersons in that district during the past five years, again both plausible hypotheses, though we tend to regard the former as more likely than the latter.

Climate and Environment

Rainfall in the Bay Region is the highest recorded for Somalia as a whole. But even here the average rainfall is less than 600 mm. (23 inches) per annum, with average variations in the range of 400-570 mm. (17-22 inches) in good rainfall years. Moreover, variability of rainfall both within and between districts of the region, and periodic droughts once in every four to five years, contributes to low crop yields and livestock off-take. There are no perennial streams or rivers within the region, the closest being the Juba River 88 km. west of Dinsoor town. All water for humans, for livestock, and for crop production is stored from seasonal flows by practicing traditional moisture-retention techniques, such as field "bunding" and the construction of small rainfed "ponds" (uar), or obtained from ground water sources by either hand-dug or machine drilled wells.

The rainfalls in two distinct and separate seasons: i) a main "heavy" rains (Gu season) with most falling in April-May and lesser amounts sometimes lingering on through June; and ii) a shorter "light" rains (Der season) most of which falls in October with lesser amounts in November and occasionally early December. In other months, average rainfall does not exceed 30 mm. (1.1 inches) and most frequently during the dry months there is no rain at all. Together with high surface temperatures that range daily from 21.5°C (70°F) at night and as high as 38°C (101°F) during the day, water retention is a major problem throughout the region. During the dry seasons as many as 60-70% of the rural population are reported to leave their homes for one or two months, because their local sources of ground water have dried up, to travel with their livestock herds.

Within the Bay Region, informants ranked Baidoa, Qansa Dhere, Bur Acaba and Dinsoor Districts, in descending order as favorable rainfall areas. But variations from year to year were also emphasized, and several informants singled out the area around Dinsoor Township as some times better in rainfall than those in Baidoa District.

Map 2 tends to confirm the rainfall rankings by district mentioned above; it displays an isohyet zone of 550-567 mm. rainfall identified by Hunting Technical Services (1977) that runs southwest from Baidoa to Dinsoor townships areas and helps to pin-point the more favorable rainfall circumstances relevant to improved sustained dryland farming in the region. However, IBRD (1979) estimates suggest that partial crop failures occur throughout the region once in every five Gu seasons and in one out of every three Der seasons. Similarly, FAO/IBRD (1977) suggests that once in every five years there may be no crops at all - a point substantiated by our informants and closely related to their traditional practice of filling underground silos with two to three years of sorghum subsistence reserves before offering surpluses for sale to others. In short, periodic short falls of rain and regular droughts are an expected and unchanging feature of the Bay Region; irrespective of whatever potential it may possess for improved crop and livestock production, it is essentially semi-arid land.

Soils, Vegetations and Land Use Potential

One positive asset of the region that is universally praised by all visitors is the outstanding, natural tilth and moisture storage capacity of its soils. Grumosols appear to predominate in the northwestern third of the region upon a modest limestone plateau which covers Baidoa and Qansa Dhere Districts, while laterite red soils dominate the flat basement system to the southeast in Dinsoor and much of Bur Acaba Districts. A small limestone depression below the plateau in the northwest quadrant of the region, straddling both Bur Acaba and Baidoa Districts is said to contain heavier, presumably sedimentary clay soils.

Thus, although most of the region is characterized by remarkably flat uniform and generally monotonous savannah bushlands, with spotty open grasslands mainly in the south between Dinsoor and Bur Acaba Townships, three micro-ecological areas with varying agricultural potential have been identified (See Map 2). These are:

i) a northern limestone plateau area, which encompasses most of Baidoa and all of Qansa Dhere Districts, and possesses the highest potential for rainfed cultivation;

ii) a southern basement complex which dominates most of Dinsoor and large parts of Bur Acaba Districts and where, because of lower rainfall and less absorbent soils, cultivation is less certain (except for isolated areas around Bur Acaba, Bar Djibis and Bur Hibi) and improved grazing and browse seem more suitable; and

iii) a small northeastern limestone depression area which we were unable to visit, but is reported to be of marginal agricultural potential and inhabited mainly by pastoral nomads for short periods of the year.

The demarcation and projected development capacity of all three areas is based solely on aerial photographs (Hunting Technical Services, 1977). There has been no soil testing to the best of our knowledge nor adequate field checkings. Indeed, various estimates of land use potential within the region display remarkable discrepancies as follows:

Figure 3: Estimates of Land Use Potention ('000 ha.)

	Lockwood 1968	ILO 1977	FAO/IBRD 1977	SDR 1978	IBRD 1979
1. Total Region Size:	4,000	5,700	2,500	(2,500?*)	4,000
2. Total Arable:	630	580	1,360	190	690
a. Under cultivation:	200-450	-	300	132	320
b. Potential cultivation:	180-430	-	1,060	58	370
3. Rangeland Only:	3,370	5,120	1,140	(2,310?)	3,310

*Assumes that the total size of Bay Region is closer to that of the 1977 FAO/IBRD estimates, a conclusion confirmed by USDA personnel currently working in the region.

As is clear from the above figures, World Bank 1979 estimates of land use potential are based mainly on the 1968 Lockwood aerial survey figures. These fail to take into consideration reductions in the total size of the region since 1969 as a result of administrative regional restructuring. Though such estimates help in projecting the size of the potential spread-effects to areas outside the current Bay Region, they do not accurately reflect development within the Bay Region itself, against which realistic development progress can be projected and measured. Hence, there are good grounds for suggesting that high priority be given to a detailed land use survey of the Bay Region before more detailed planning and implementation are undertaken, particularly in the development of any Pilot Agricultural Development Units (PADU) for each district of the region and the drilling of new wells.

Special consideration needs to be given to the 1978 SDR/Planning Commission estimates for arable land "under cultivation" and "potentially cultivation" which are substantially lower than both 1977 FAO/IBRD and 1979 World Bank estimates, to determine whether these marked differences relate simply to differences in land unit definition (e.g., lands actually under crops, versus lands under rotational cultivation over several years, versus lands suitable for cultivation) or whether they derive from significant differences in baseline data.

Minimally, there is great need to resolve these wide ranging differences in the estimates of land use potential of the Bay as a matter of priority, not only before new road and water resources are implemented, but also in order to insure appropriate curricula emphases in the training/research components of the project, and effective institutional-building of the extension services.

Livestock and Economy

A crucial feature of the overall agricultural system of the Bay Region is the dependence of the vast majority of farming families on both subsistence and income derived from livestock (and increasingly poultry) holdings which are essential for their survival. Indeed although the 1975 National Census highlights the Bay Region as possessing the highest percentage (47%) of "settled farmers" in comparison to other regions of Somalia (22%), the 302,054 total population living in the region then were enummerated according to the following "settlement type" categories, from which projections for 1980 can be made:

Figure 4: Bay Region Settlement Types
(based on 1975 Census, projected to 1980)

	1975 %	No. persons Est. for 1980	No. House-* holds est. for 1980	No. persons* per Household
1. Non-Agricultural (mainly wage-earners and towns-persons)	20%	68,683	16,700	4.1
2. Settled Farmers (including semi-nomads)	47%	161,405	29,400	5.5
3. Pure Nomads (most of whom live in the region)	33%	113,327	31,500	3.6
TOTALS:	100%	343,415	77,600	4.4

*Household estimates based on assumption of 5.5 persons for average farming family which is confirmed by USDA team members, and 4.1 persons per non-agricultural and 3.6 persons per pure nomad family.

However, because of the lack of permanent ground water for human and animal use during at least one to two months of each dry season, many of the so-called "settled"farmers of the region must move with their livestock

away from their farms, often in the case of Dinsoor and Bur Acaba as much as 80-100 km. Indeed, except for Qansa Dhere and smaller portions of Baidoa Districts, in both of which our informants suggested that only 25-30% of farming families are forced to move in normal years, Some 60-70% of all other "settled farmers" of the region do move away for one to two months each dry season, practicing what is perhaps best described as "transhumant farming." Together with the pure nomads of the region, this implies that at least 50% of the total regional agricultural system is transhumant and that perhaps as much as 90% of it is livestock dependent.

This dependence on livestock is also reflected in the dispersed ordering of the farm system. Though individual families (haasas) build separate mud and wattle "houses" (mundille), several family households (generally eight to ten), live together within the same fence-enclosed "hamlet" (digmo) in which they corral their livestock collectively at night and often herd them jointly during the day, sharing available herdspersons with other families of their hamlet. Because the hamlet's farm fields adjoin or radiate out from it, these nucleated hamlets (40-60 persons) are generally widely dispersed from one another in the countryside, sometimes up to two km. or more, with "commons" grazing lands between them.

Several hamlets form a "parish" (bullo) which generally focuses on a common source of ground water, such as a rain-fed "pond" (uar) dug communally by members of the hamlets of which it is comprised or, less frequently, a hand-dug or drilled well. Each parish is generally separated from another by wider areas of common grazing, often interpenetrated by the pure nomads, and several parishes (often 10-15) make up a "village" (Tulu, pl. Tulayad) under the administrative control of an elected "nabad-doon" ("peace-maker"; also referred to simply as chief or herdsman), with several "assistants" (samadoons) from representative parishes. Villages vary enormously in size depending upon local environmental conditions, and some are reported to contain as many as 5,000 persons, comprising an area of 25 km. (2,500 ha). Generally, each village has within its area at least one settlement center of shops and other village facilities which form the focus for the parishes and hamlets of which it is comprised, and at which the Agricultural Development Corporation (ADC) has collecting centers for purchase of farm produce for export from the village. In favorable climatic areas, village territories may adjoin one another. But in dryland areas they tend to be more widely dispersed than parishes with even larger areas of "commons" grazing lands between them among which the pure "nomads" tend to move more regularly than the "settled farmers."

1975 estimates (Hunting Technical Services, 1977) of livestock populations and densities for the Bay Region--then a somewhat larger territorial unit than today--are as follows:

Figure 5: 1975 Livestock Population by District (in '000)

	Camels (%)	Cattle (%)	Sheep (%)	Goats (%)
Baidoa District	94.0 (26%)	55.5 (22%)	21.0 (39%)	69.0 (36%)
Bur Acaba District	142.0 (39%)	99.0 (39%)	17.0 (31%)	55.5 (25%)
Dinsoor District	77.0 (22%)	70.5 (28%)	6.0 (61%)	19.0 (10%)
Qunsa Dhere District	48.5 (13%)	30.5 (11%)	10.5 (19%)	48.0 (29%)
TOTAL BAY REGION:	361.5(100%)	255.0(100%)	54.5(100%)	192.0(100%)

Figure 6: 1975 Livestock Densities by District
(No. of animals per sq. km.)

	Camels	Cattle	Sheep	Goats
Baidoa District	8.5	5.0	2.0	6.3
Bur Acaba District	14.2	9.8	1.7	5.5
Dinsoor District	8.6	7.8	0.7	2.1
Quansa Dhere District	6.9	4.4	1.5	6.9

On the other hand, 1977 estimates by the World Bank (1979 Appraisal Report, p.7, where the basis for their estimate is not revealed) for the total Bay Region suggest a substantially lower number of camels and cattle, but higher number of sheep and goats combined as follows: 281,000 camels; 196,000 cattle; and 411,000 sheep and goats combined.

This discrepancy is not easily explained. Though reductions in size of the region between 1975 and 1977 is a tempting hypothesis, other data presented in the World Bank appraisal report does not appear to take this into consideration. What is noteworthy in the 1975 estimates, however, is that Bur Acaba and Dinsoor Districts which have lower human populations and densities, and fewer numbers of "settled farmers," do have appreciably higher camel/cattle total holdings than Baidoa and Qansa Dhere Districts, while the latter have significantly higher sheep/goat total holdings than the former which possess appreciably lower rainfall. In short, the livestock dependency of "settled farmers" in the two wetter rainfall districts of the region seems to be based more on small stock holdings, whereas that of the two dryland districts are more oriented or dependent upon large stock holdings.

The data on average "farm family livestock holdings" are both inadequate and suspect, and constitute an area of high priority in the development of relevant baseline data to meet project design needs. FAO/IBRD (1977) estimates report 10 animal units per average farm family (5 camels, 3 cattle and 4 sheep/goats), and the World Bank estimates (1979) speak of 12 such animal units. Though these estimates also speak about the numbers "varying from almost none in the heavily cropped areas to many in those areas, such as Dinsoor, where there is much uncleared savannah near croplands (1977)," and point out that "two such units are kept near the homestead and the remainer on the rangelands," it appears that both estimates derive solely from dividing the total regional animal units estimated in 1975 by the estimated number of "rural households," without consideration of the numbers of such units held by the pure nomads who comprised 33% of the region's households. Though we were unable to gather data sufficient to clarify this matter, a USDA (1980) survey of 27 farm families, mainly in Baidoa District, suggests that 48% owned no camels; 15% no cattle; 23% no goats, and 37% no sheep - but that 34% of all those interviewed would, as a matter of high family priority, "buy more livestock if they had more money." Since animal-traction inputs are an important element in the overall Bay Region project design, and our observations of "progressive farmers" indicate that they use camel-traction for bunding of fields to harvest rainwater and oxen to plough, better data on the numbers of large stock owned or available to farm families are crucial to estimate of probable project success and spread effect.

The Historical Background to Development Potential

The potential of the Bay Region for development has been known since the early 1960's when a USAID study team surveyed the Inter-Riverine Area (ICA, 1961). Earlier in 1954, the Somalia MOA had established just north of Baidoa township the Bonka Farmers Training Center, which received USAID assistance from 1957-1970, the most notable being the University of Wyoming Agricultural Training Program at Bonka from 1964-1970. Following the expulsion of all USAID operations from Somalia in 1970-71, activities of the Bonka Center were severely curtailed due to lack of adequate funding from the SDR.

In 1972, a World Bank RMEA Identification Mission partially identified a project to be located around the towns of Baidoa and Bur Acaba, and, subsequently, Missions from the Northwest Regional Agricultural Development Project proposed a detailed study of the Bay Region. The SDR then requested Cooperative Program (CP) assistance in identifying and preparing a project for the region, which was undertaken by an FAO/IBRD-CP-Identification Mission early in 1977, followed by a World Bank Appraisal Report Mission in mid-1979.

Spread-effects of the Wyoming Project

Though technical evaluations of the USAID/Wyoming assistance to the Bonka Farmer's Training Center are discussed later in this report, brief mention can be made here of its limited spread-effect during the period 1970-80.

Of the over 2,000 persons who were reported to have received some training during 1965-70 at Bonka (Wyoming, 1971), only 45% received more than a one-day tour of the facility: 44 students (2%) were given three-month In-Service Extension Training, and 809 farmers (43%) a two-week "farmers" course. During our brief field survey through the Bay Region, we were unable to identify, and thus talk with, any of the students or farmers who had received more than the one-day tour.

Of the 14 students who were sent to the USA for 3-4 months of extension courses at the University of Wyoming, only three (22%) still work in Bay Region, two for the regional MOA in Baidoa and one at Bonka: seven other students (50%) still work for MOA but in other regions; two students have retired from the MOA altogether; one is pursuing higher education in Libya; and one was killed in an automobile accident.

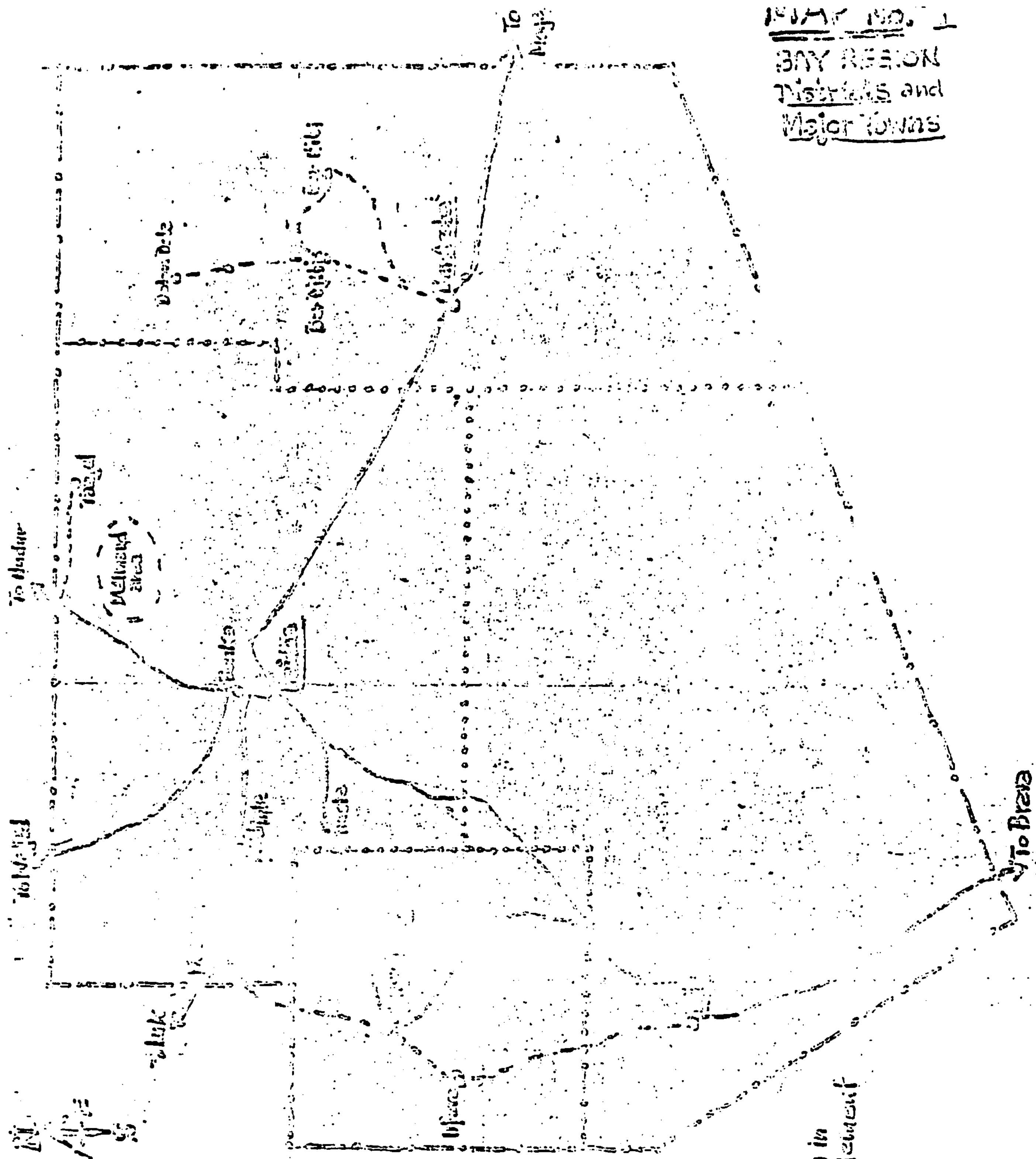
Of the eleven (11) students sent under the Wyoming Project to the USA for higher degree training (BSc. and M.S.), none are or have ever worked directly in the Bay Region: three (27%) do, however, hold positions within the MOA at Afgoi and in Mogadishu; another three are reported still to be pursuing studies in the USA; still another three (27%) are said to be employed outside Somalia, two in Saudi Arabia and the third in Hawaii and the whereabouts of the remaining two students is unknown. Training, in this instance, has had only indirect bearing on the Bay Region through collaboration with MOA officials trained in the U.S.

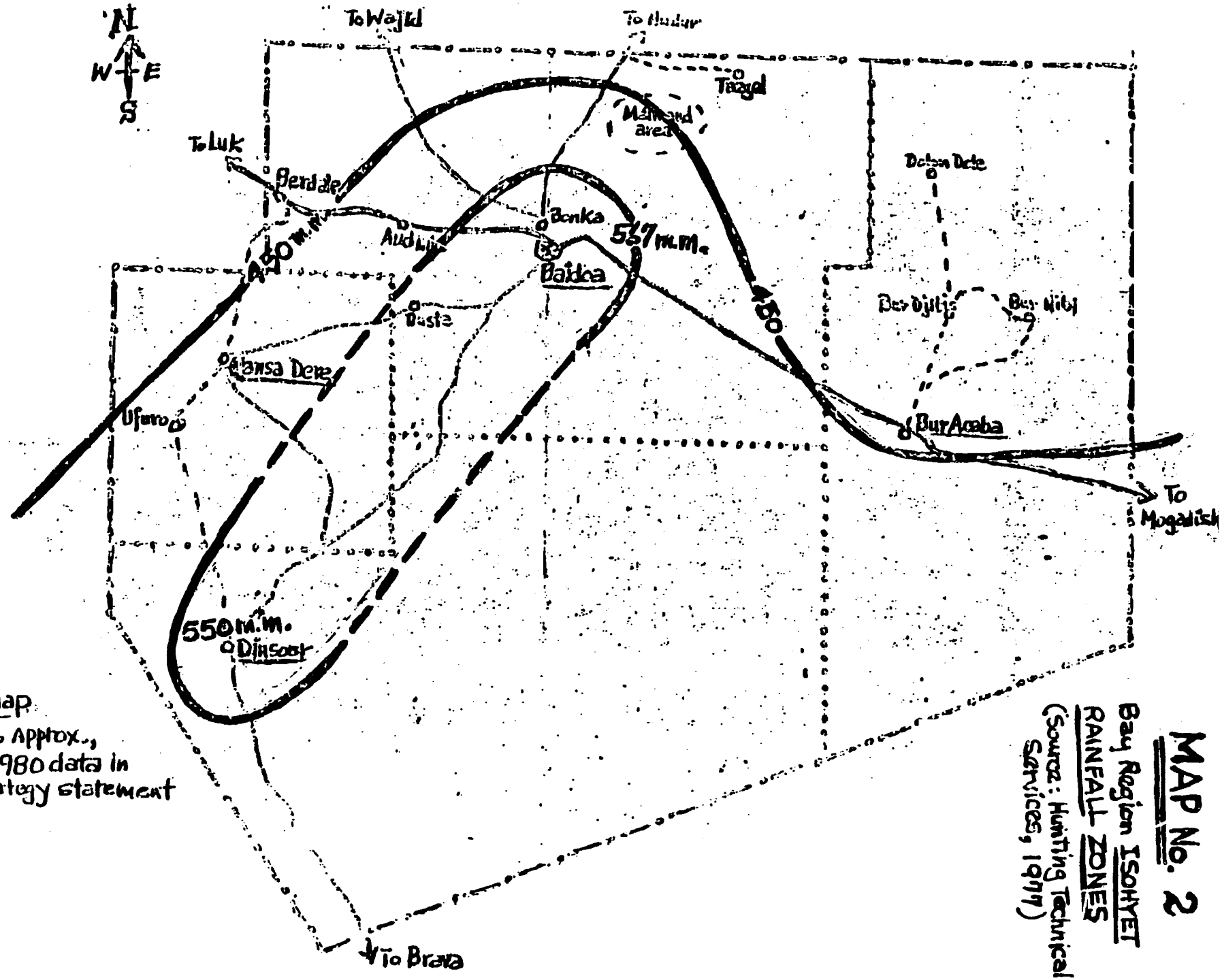
Although the Wyoming Project conducted some useful research at Bonka on field preparation, row cultivation with animal traction, crop varieties, pest control and manure application, the 1977 FAO/IBRD and World Bank 1979 Missions found little evidence that these improved techniques were being adopted by farmers of the Bay Region, and our own observations tend to confirm this judgment. Their efforts at developing further extension/research packages have not yielded any significant results. Though great interest was expressed by farmers in animal traction training, there appears to be a greater need for more simplified and appropriate technologies associated with it than those tried by Wyoming, such as cheaper wooden framed, single blade ploughs rather than the metal framed 3-4 blade ploughs introduced. Similarly, though there have been minor increases in crop diversification and poultry raising, it is difficult to judge the extent to which these can be attributed to the Project, since all these crops (save watermelon) were reported to be in cultivation in the Bay Region as early as 1954.

Although lack of SDR funding and follow-up of a well structured and highly motivated extension service are often cited reasons that the technologies did not spread more widely, it is also likely that the unique dialect and communications problems of the Bay Region within Somalia also contributed to lack of spread - a point that is developed more fully later in this report.

Unlike northern and central regions of Somalia, territorial loyalties in the Bay Region gave rise to traditional, mutual "self-help" work-parties or associations, involving voluntary membership, organized on a hamlet, parish or village basis. The most important of these were:

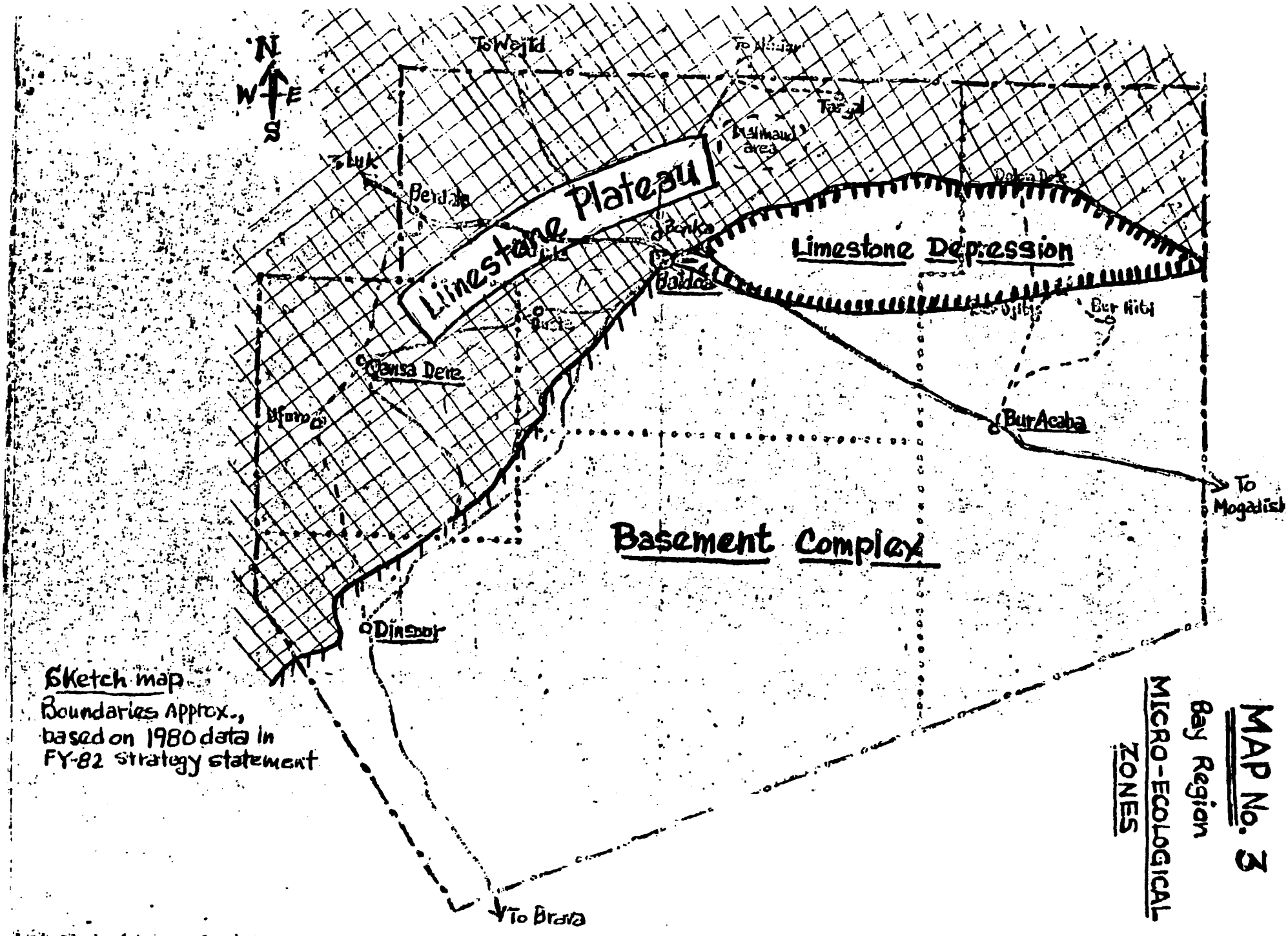
MAP NO. 1
BAY REGION
Districts and
Major Towns





Sketch map
Boundaries approx.,
based on 1980 data in
FY-82 strategy statement

MAP No. 2
Bay Region ISOHYET
RAINFALL ZONES
(Source: Hunting Technical Services, 1977)



MAP No. 3
Bay Region
MICRO-ECOLOGICAL ZONES

i) Soddon ("the thirty"), mainly male family heads under a leader's call who work together in the fields and on communal projects, such as water ponds (uar) construction and maintenance, from which they derive personal benefits;

ii) Go'ob, a group of younger men or youth who work under the direction of village sub-chiefs or assistants, with their own head (au); and

iii) Gamas, usually organized only at the hamlet or parish level, with their own heads but more informal and ad hoc in activities.

In Soddon and Go'ob self-help associations, work was obligatory and absence incurred fines, whereas in the Gamas associations there was no formal penalty except social rebuke.

Given this traditonal predisposition to hierarchical leadership and "mutual self-help" organization, it is not surprising that farmers in Bay Region have taken eagerly to joining modern agricultural cooperatives (Iskaashatoo) and establishing group farms (Tacab Wadag) with government assistance, and that the region now possesses 42 such organizations, or 17% of the total number of registered agricultural cooperatives in Somalia today, and more than the government can continue to support effectively at this time. In addition and equally important as development units, there are reported to be close to 100 Agricultural Islamic Brotherhood Communities (Jamaa'a) in the Bay Region, of which Sheikh Banaana's (Abdu Rahan Mohamed) agricultural community at Toos Winye in the Gel Gel area of Baidoa District has over 3,500 persons. It is most frequently displayed to foreign visitors by both the (political) Union of Somali Cooperative Movement and MOA officials as a "show place" model of both cooperative and self-help enterprise.

Language and Dialect

As I.M. Lewis (1978) has very correctly pointed out, the Somali attach great importance to oratory, proverbs and poetry, and the spoken word is often the key to the successful exercise of influence and authority among them. As part of their Islamic traditions, they are less interested in, or moved positively by, pictorial or other representational visual materials. We were impressed in our visits to all government offices by the total lack of maps of any kind relating to the Bay Region or its districts, or of organizational diagrams or tabular charts of its main characteristics - none of which, we were told, could be explained simply or solely as the result of military security.

This is beginning to change, of course, in schools, among young people, and in the urban centers. Indeed the 1974 "Rural Development Campaign," in which the SDR takes great pride, was essentially and in large part

simply a mass "literacy program" designed to promote the new orthography that had been adopted in 1972 for written Far Soomaali as the national and unifying language of which there are, in fact, five regional variations in accent. But for the majority of the rural population today, the spoken word is still the only vehicle of communication, and extension efforts are better advised to place emphasis on verbal skills and simplified "show-and-tell" demonstrations (ideally sprinkled with excerpts from Maxamed Shire Maxamed's, Somali Proverbs, 1974) rather than on elaborate audio-visual aids, such as posters, slides, film strips or educational cinema.

Thus, respect for the importance which Somali attach to direct verbal communications needs also to be engendered amongst all expatriate personnel recruited to work on the Bay Region Development Project. To this end it is highly recommended that such persons be given minimally, in Mogadishu or the Bay Region, the equivalent of at one-hour's language instruction per week for one to two months in Far Soomaali in order that they can lace their conversations with English-speaking Somali counterparts with accurate and effective local words and convey simple sentences or instructions to those who do not speak English. Because no appropriate English-Somali dictionaries/grammars exist, such personal instructions will greatly aid the effectiveness of those persons who wish to attempt greater fluency in the local dialects on their own.

But expatriate language needs are not the only communication problem. As indicated earlier, rural farmers of the Bay Region speak a unique dialect within the country of Far Soomali, called Af-Maymay, which is generally mutually-unintelligible to other speakers and involves more than simple differences in accent or idioms. It not only possesses five fewer consonants and a simpler vowel system than Far Soomali (based on conversations with the Head, Faculty of Languages and Literature, Somali National University, March 1980), but it also contains an extensive lexicon which differs markedly from Far Soomali. For example, in the latter it is critical to hear the difference between dad ("people") and daad ("floodwater"), or between di'bi (ox) and dibi ("oxen"), all of which have different words in Af-Maymay dialect, in spite of the fact that both forms of the language also share the same basic grammar and many words in common. Thus, although speakers of the two dialects can generally identify the subject matter being talked about and sometimes reply to simple sentences, they regularly do not understand fully or accurately what is being said.

National policies dictate, of course, that Af-Maymay speakers should become fluent in Far Soomali, the official National language, and many have in fact acquired such fluency, especially political-economic leaders and influential persons. But rural farmers the world-over tend to share common characteristics, and both common sense and experience elsewhere suggests that if anything approaching effective communciations between them and extension agents is to be achieved both sides must make the effort to move closer linguistically to attempting to understand each other.

Since it appears that the vast majority of current MOA personnel working in the Bay Region are not native speakers of Af-Maymay nor do they possess a sterling record of extension outreach to rural farmers yet Af-Maymay is clearly the easier of the two dialects to adjust to. two recommendations follow from the special language conditions of the region:

i) that a greater effort than hither to be made to recruit qualified Af-Maymay/Far Soomali speakers into the extension and applied research services of the project; and

ii) that in the case of all extension and service personnel recruited to the project, as well as expatriates, special attention in the training program be given early on to instruction in the lexical and phonetic dialectical differences between Af-Maymay/Far Soomali, ideally by someone such as Omar (Chicago) Mahomed Hassan, Regional Extension Coordinator at Baidoa who is fluent in both dialects, for at least three hours per week for one to two months, in order to promote effective communication skills between extension/service personnel and rural farmers.

Our best guess is that with such instruction and sensitivities developed, extension agents/service personnel will be communicating directly with farmers within two to four months, depending on variations of aptitude and attitude, and the quality and accuracy of their communications will be much improved. In short, although the language and communication problems of the Bay Region are real and constitute a special case within the larger nation, they are not judged to be a serious obstacle to project success if appropriate recognition and action to ameliorate them are conscientiously undertaken.

Characteristics of the Target Groups

Quantitative data on the socio-economic characteristics of target groups in the Bay Region and their locations within the four districts are almost totally lacking. That which we have been able to collect, collate, analyze and present throughout this report also suggests low reliability. The USAID/USDA "Impact Project" (649-0101) currently in the field is charged with the responsibility of testing appropriate farm management/production/extension packages and not with the task of collecting data on a district or regional basis against which on-going socio-economic changes can be monitored or measured, or against which strategies chosen by project policymakers to achieve production objectives can adequately be judged to be beneficial (and equitable) to the largest numbers of people.

While it is true that Annex Ten of that Project Paper calls for an initial and two follow-up surveys of farm practices within the region by USDA recruited personnel, our review of the results of the initial survey causes us to doubt that adequate quantified base-line data will emerge from such short-term surveys.

The World Bank Appraisal Report (1979) calls for appropriate anthropological/rural sociological and economic statistical inputs only in the second year of project implementation and then based in Mogadishu with responsibilities to an independent "National Monitoring and Evaluation

Facility," to be located in the State Planning Commission. This seems unwise and inadequate for two major reasons:

i) The Bay Region Project has more urgent needs for such base-line data earlier in the implementation phase, in order to better decide on the location of road and water improvements designed to both increase production and to insure effective and equitable spread of benefits throughout the region.

ii) The SDR has already charged the newly created Somali Academy of Sciences and Arts (SASA) with the responsibility of conducting and monitoring all applied sociological research throughout the nation, and with coordinating such research among the various ministries and agencies (personal conservation with Madame Deeqa, Head of SASA, March 1980). They have buildings under construction in Mogadishu, budget proposals under consideration, and by the end of 1980 plans to initiate research priorities.

Thus, although the statistician/economist proposed by the World Bank for project monitoring and evaluation might usefully be located in Mogadishu with SASA and work cooperatively with the State Planning Commission, it is strongly recommended that the anthropologist/rural sociologist be based for at least 9-12 months in the Bay Region under the direction of the PMU, working alternatively among all of the four districts -- and that both technicians be brought on board the project during its first year, in order to develop critical base-line survey data of a socio-economic variety necessary for effective decision-making as to the more detailed location and probably spread effects of other inputs.

Location of Target Groups within the Region

As noted earlier in Figure 4, the total estimated population of the Bay Region for 1980 (343,415 persons) is divided into three main settlement categories: i) largely non-agricultural wage-earners (20%); ii) settled mixed farmers, many of whom are also transhumant for at least one to two months during each dry season (47%); and iii) pure nomads, most of whom are reported to reside within the Region but range widely throughout it (33%). The distribution, density and location of persons from these three categories, both within and between the four districts, is largely unclear. Until better data is available than we were able to collect and analyze under the existing circumstances, the spread effects and benefits to be derived by members of each category from each category from planned project inputs within the region remain highly conjectural. Indeed, unless carefully monitored, the principal direct beneficiaries of project inputs may be the wage-earners working solely for the project and the urban townspersons both within and outside the region, though this too is unclear at this time.

On the other hand, what data we were able to collect suggests that "non-residence landowners," "tenant farmers" and "landless agricultural labors" do not constitute any sizeable portion of the Bay Region population, nor are they significant elements in the social landscape

generally that deserves any special attention within the scope of this project. Indeed, the SDR is to be commended among LDCs for its enlightened land tenure policies (1974) that prohibit non-resident land ownership, discourage the formation and exploitation of landless agricultural laborers and tenant farmers, and which promote and provide equitable access to the means of production. Apparently it is only in Bur Acaba and Dinsoor Districts that any evidence of "absentee landlords" still lingers and even there it is rapidly disappearing: we were told that some farmers (no more than 5-8% of the total) initially paid So. Shs. 200/- each growing season to persons who claimed customary ownership of the land, but that they could cultivate any number of hectares they wished for that amount, and at the end of two years gained free rights to the use and registration of the land under the new act. Similarly, wage laborers live and seek their livelihood mainly in the towns; although some seasonal agricultural labor may occur, there is no significant or sizeable population of landless agricultural workers.

There was not time under the contract terms or scope of work of this report to develop meaningful statistics or socio-economic profiles for the three basic settlement categories noted above. One relevant observation, however, and one confirmed independently by others is that there were far fewer radios among both rural and townspersons than we had initially been led to expect in so verbally-oriented a culture as that of Somalia, not as many flashlights as is so characteristic of other LDCs. Kerosene for lamps and cement to reinforce mud-wattle housing in the rural areas, and expensive body sarongs (maawis), costing as much as S. Shs. 200/- each, in the towns seemed to be the only conspicuous consumer goods.

The absence of radios or other forms of modern media in the rural areas highlights again the importance of population densities and traditional (as well as modern) social groupings as the most effective vehicles for communications of extension services, rather than individual "key farmers." Thus, further insight into the nature of the target groups between the four districts can be gained from a consideration of the following figures.

Figure 8: Bay Region Sorghum Sales to ADC by Region (quintels)
(Source: Regional Head, ADC, Baidoa Town)

District	No. ADC Collecting Points	(%)	1980 est. of q. quota based on 1979 Purchases	(%)
Baidoa	45	(42%)	54,000	(28%)
Bur Acaba	20	(23%)	20,000	(10%)
Dinsoor	14	(16%)	20,000	(10%)
Qansa Dhere	16	(19%)	100,000	(52%)
TOTALS	86	(100%)	194,000	(100%)

Although seasonal variations in rainfall and a probable drain of sorghum sales privately to the urban town centers of Baidoa and Bur Acaba are relevant (along with possible black marketing), it is nevertheless significant that Qansa Dhere District alone accounts for more than 50% of the region's total ADC sales, especially since it is the smallest of the four districts, lowest in population and is the least developed in terms of infrastructure.

Figure 9: Bay Region Primary Schools by District
(Source: MOE, 1978 figures)

District	No. Schools	(%)	No. Students	(%)	Est. ratio of Household per student
Baidoa	28	(44%)	6,736	(58%)	3.8
Bur Acaba	20	(31%)	2,613	(22%)	6.5
Dinsoor	12	(19%)	1,627	(14%)	5.5
Qansa Dhere	4	(6%)	731	(6%)	10.9
TOTALS:	64	(100%)	11,707	(100%)	6.6 average

Not surprisingly given its regional capital, Baidoa District has the highest percentage of children in school, and together with the Bur Acaba District 80% of all the region's school population. This is consistent with data presented in Figure 2 which estimates that both Districts also contain 79% of the region's total population. What is noteworthy, however, is that Qansa Dhere District not only has a substantially lower percentage of students attending school (and lower ratio of students enrolled in school per household), but it also sells to ADC for export from the region, as noted in Figure 8, more sorghum than the other three districts combined. Qansa Dhere is scheduled to receive a larger per capita subsidy from the Central Government under the three-year Development Plan -- See figure 10.

Figure 10: Bay Region District Revenue by Source (So. Shs. '000)
(Source: SDR 3-year Development Plan, 1979-81)

	Central Govern.	(%)	Local Govern	(%)	Coops & Self-Help	(%)	Trade Sector	(%)	TOTAL	(%)
Baidoa:	400	(35%)	1,600	(56%)	100	(10%)	300	(44%)	2,400	(42%)
(% of Total)	(17%)		(67%)		(4%)		(12%)		(100%)	
Bur Acaba:	300	(26%)	300	(11%)	500	(50%)	250	(36%)	1,350	(24%)
(% of Total)	(22%)		(22%)		(37%)		(19%)		(100%)	
Dinsoor:	200	(17%)	434	(15%)	200	(20%)	100	(14%)	934	
(% of Total)	(21%)		(47%)		(21%)		(11%)		(100%)	
Qansa Dhere:	254	(22%)	500	(18%)	200	(20%)	40	(6%)	994	(17%)
(% of Total)	(26%)		(50%)		(20%)		(4%)		(100%)	
Region Totals:	1,154	(100%)	2,834	(100%)	1,000	(100%)	690	(100%)	5,678	(100%
(% Total Source)		(20%)		(50%)		(18%)		(12%)		(100%

Several features are of particular interest in these figures:

i) the proportion of total revenues of the region generated by each district is more or less consistent with its proportion of total regional population (see Figure 2), though Baidoa District produces (or receives in Central Government subsidies) substantially (17%) less.

ii) Central Government subsidies to the four districts appear consistent with SDR policies aiming at promoting more equitable development between districts, with Qansa Dhere District (the smallest and least highly developed) receiving a substantially larger proportionate share than its proportions of the regions total population.

iii) Bur Acaba District (and to a lesser extent, Dinsoor) generates slightly less local government revenues than its proportional percentage of the total regional population would expect, this possibly being related to a higher proportion of pure nomads from whom it might be more difficult to collect taxes.

iv) not only do proportionate revenue from "co-operatives"and"self-help"sources exceed those from "trade" in all districts except Baidoa (which is exceedingly low in this category), but 50% of the total revenue generated in Bur Acaba District derives from such sources, suggesting that as a district it possesses unusual development potentials among its human population. Indeed, in conversations with MOE in Mogadishu,one team member was informed

that Bay Region would probably acquire a second Secondary School in 1981, to be located at Bur Acaba because of self-help monies generated locally.

Cooperatives and Key Farmers

As indicated elsewhere, the SDR is committed in its efforts to achieve equitable development to the concept of "cooperatives" (Iskaashatoo) organized and regulated under the National Cooperative Development Law of October 1973. Three types of cooperatives are distinguished and members are expected to progress through each stage:

1) Multipurpose Cooperatives (called FACOs) in Bay Region, i.e., Farmers Agricultural Cooperative Organizations), in which members engage in joint purchase of farm requisites, joint marketing of agricultural produce, but individual use of land and ownership of its produce is permitted. Membership involves a So. Shs. 5/- entry fee, So. Shs. 10/- for each hectare cultivated, plus special privileges to the hire of tractor equipment when it is available, as well as government assistance in bookkeeping and accounts, etc.

2) Group Farms (Tacab Wadag) where members continue to be attached to a multipurpose cooperative (FACO) but engage in semi-collective cultivation using machinery and equipment in common and sharing the net product after deducting expenses according to labor or effort supplied. Individual members are permitted to cultivate their own traditional holdings separately and independently from the collective group farm. Central Government often supplied food to get them started, as well as all those services accorded to FACOs.

3) Production Cooperative Farms (Hersare) are the final planned stage, where farmers pool their resources and consolidate their land into larger units, and collectively cultivate new lands provided by the State, but are permitted to keep a private homestead of 0.5 ha on which to have a house, and keep a cow, poultry and a limited number of other small livestock.

Although there are no Production Cooperative Farms in Bay Region, and registration of new FACOs and Group Farms have all but stopped due to the government's inability to supply promised inputs to existing cooperatives, Bay Region represents 26% of the total national hectarage under FACO cultivation and 20% of the total national hectarage under Group Farm cultivation. More importantly, perhaps, Bay Region represents 72% of the total rainfed national hectarage under FACO cultivation, and 43% of the national rainfed hectarage under Group Farm cultivation.

Figure 11: Bay Region Cooperatives by District (1979)
(Source: MOA, Cooperatives Department)

a) Multipurpose Cooperatives (FACOs)

District	No. FACO	(%)	No. Members	(%)	Rainfed Total ha.	(%)
Baidoa	2	(25%)	772	(38%)	2,401	(29%)
Bur Acaba	2	(25%)	415	(24%)	1,987	(24%)
Dinsoor	2	(25%)	583	(28%)	2,393	(28%)
Qansa Dhere	2	(25%)	293	(19%)	1,631	(19%)
Total Region:	8	(100%)	2,063	(100%)	8,412	(100%)
National Totals:	48		14,014		11,652	

b) Group Farms

Baidoa	14	(12%)	764	(36%)	1,919	(28%)
Bur Acaba	11	(26%)	315	(15%)	1,923	(28%)
Dinsoor	12	(29%)	677	(32%)	2,041	(29%)
Qansa Dhere	5	(12%)	371	(17%)	1,030	(15%)
Total Region:	42	(100%)	2,127	(100%)	6,913	(100%)
National Totals:	233		15,584		16,069	

From these figures it will be noted that the number of FACO and Group Farms seem to be evenly distributed and proportionate to population proportions among the four districts, and thus consistent with SDR policies aimed at promoting equitable development. However, again Baidoa District stands out as possessing a substantially lower proportion of the numbers of members/total rainfed hectares organized into FACOs and Group Farms than its proportion of the total regional population. Though part of this is no doubt related to its higher urban town population, it nevertheless seems unlikely in light of data presented in previous figures on sorghum sales to ADC, revenues, etc., that its lower involvement in cooperative activites can be explained away simply on that basis. Indeed, it can be conjectured that there is potentially more individualism and individual enterprise existant in Baidoa than is characteristic of the other districts.

What conclusions can be drawn from this admittedly inadequate data and any preliminary analysis? First, that cooperatives are likely to remain a part of the predictable socio-political landscape of the Bay Region, irrespective of current decisions to slow down their registration. There are, as noted earlier, historical precedents for it in the Bay Region (as opposed to elsewhere in Somalia) and increasingly political support from the political party (SSRP). For example, we collected evidence that the traditional "assistants" (Samadoon)to village Nabad-doons, who were simply distinguished elected elders from various village parishes are now being systematically replaced by Gudomiyas (assistant to the Nabad-doon for food production) and Kaliye (their

assistants, referred to in Somali-English as "Vice Commanders"). In Af-Maymay dialect the new Gudomiya is called "Aw-Go'ob", which we noted earlier was the traditional term for "leaders of the localized youth associations." Not surprisingly, these new leadership roles are being filled by young men with past military service who report directly to the District Commissioners or their (political) deputies. Moreover, whereas the traditional Samadoon received no salary for serving as assistants to the Nabad-doon (who is salaried So. Sh. 400/- per month by local government), the new Gudomiya and Kaliye also operate as ADC collecting agents within the village, and receive So. Sh. 10/- and 5/- per day when working in that capacity.

Secondly, there seems however to be significant differences in the degree of cooperative involvement (and thus, perhaps, differences in family farm systems) between the four districts. Baidoa District seems distinctly less self-help, cooperative-oriented and Bur Acaba District highly so, with Dinsoor and Qansa Dhere closer in character to the latter rather than the former. Experience elsewhere in neighboring East Africa suggests that agricultural extension efforts directed to groups of farmers is more effective and less regressive than that directed to individual farmers. Thus, the thrust of planned extension efforts ought, ideally, not only to be directed first to existing FACOs and Group Farms and only secondarily to traditionally organized "parishes" (bullo) and "hamlets" (olgmo), but unless the above analysis of potential differences between the four districts is wholly illusionary - such efforts are likely to have both faster and greater spread effects if undertaken more vigoursly in Bur Acaba, Dinsoor and Qansa Dhere Districts than if pursued mainly in Baidoa District.

Much of the same argument could be made for suggesting that the PADUs proposed by the World Bank Appraisal Report (1979) are too large in population and rangeland size to achieve their planned effects. Rather than four major PADUs, all the existing FACOs might be better scheduled for PADU inputs or, better still, a series of new FACOs for all the districts be formed to receive such inputs.

District Crop/Livestock Committees

Among the many social theories or "laws" that have emerged from social science research during the past century or more (e.g., "Power, as opposed to authority and influence, corrupts; and absolute power corrupts absolutely"); two seem particularly relevant to the Bay Region Development Project:

i) projects planned for recipients rather than with recipients seldom succeed; and

ii) the best designed plans always have unintended and unwanted consequences. That is, what nobody expected to happen, or wanted to happen, happens. Hence, careful monitoring and feed-back of implementation is mandatory to achieve success.

Together, these two principles highlight the need, which is no where dealt with adequately in existing plans, for the creation of some sort of "crop/livestock advisory committee," made up farm recipient representation, to assist (feed-back) the Project Management Unit (PMU) in both detailed planning and implementation in all four districts. The BRDP actually comprises four districts, with varying socio-economic and environmental conditions. Sight must not be lost as to the need to gain feedback and plan differently for each district.

Such committees should be formed in each district, consisting of representative active crop and animal producers, both male and female, and representating "cooperative" as well as individual farm systems. A single regional committee is unlikely to substitute adequately because of the different socio-ecological characteristics and opportunities offered by the four districts. Local political as well as administrative representation should be sought from key ministries or agencies relevant to specific project goals in the district, but should not (ideally) outnumber that of representatives of the farmers/herders.

As an advisory committee, it should have a core membership of not less than 9 persons nor more than 18 to insure meaningful and manageable, but essentially democratic discussion procedures. (Studies elsewhere suggest that numbers on either side of this range for ad hoc committees tend to be dominated by the chairperson). The chair might best be the District Commissioner, with core farmer/herders membership being appointed by him from local persons with the authority to commit the community of groups they represent to production decisions. The core should contain not less than two women, one representing the local [redacted] SWDO. Membership from key ministries or agencies might be organized on an invitational basis, and vary from one meeting to the next depending on the details of matters that the group is called together to discuss.

Meetings should be called at least once each year in each district, the format being for the chair to call upon the Project Management Team to describe its planned activities in the District and to receive and discuss advice tendered by the Committee. At least two to three hours

should be scheduled for each meeting, with members being instructed by the chair to spread the news of the content of matters discussed widely to their consticuencies.

These are, of course, simply hastily conceived suggestions that may very well be modified in the light of local situations. But some such committee organization is recommended to insure more effective representation and participation in planning by recipients of the project to help insure its success.

C. Role of Women

Background

Under traditional customary Somali law, reinforced by Islamic practices, women were always under the legal protection of their fathers, husbands, or in the event of their death, their husband's father or brother. In blood compensation, a woman's injury or death was valued at half that of a man's. Daughters inherited only a half or third as much as their brothers, and among the nomadic elements they could rarely inherit camels,or among mixed farmers, rights to land.

Following WWII, all political parties in Somalia established women's committees to mobilize support for their movement. In the south (Italian Somaliland at that time), women voted for the first time in municipal elections as early as 1958; in the north in the 1961 national referendum on the constitution. But, generally speaking, their role continued in public affairs to remain minimal, though within the family they were often reported to be "forceful characters who shrewedly exercised more influence than is apparent on the surface" (I.M. Lewis, 1978).

This minimal public role changed dramatically after the 1969

Somali Revolution. Women were all of a sudden urged to take an active part in government, in sports, in self-help projects and committees, and in council decisions. Special committees were set up to deal strictly with women's affairs. In 1971 a national woman's organization (which later in 1977 became the Somali Women's Democratic Organization, SWDO), was established by Presidential Decree as one of the main vehicles of mass mobilization to insure that laws relating to women were being enforced.

On January 11, 1975, President Siyad - recalling the message of equality, justice and social progress contained in the Quran -- announced a decision of the SRC and the Council of Secretaries of State to give equal rights to women in several respects, including equal inheritance rights, etc. which is now referred to as the new "Family Law." Men could no longer divorce their wives at will, and women gained rights in the courts to dispute divorce settlement and proceedings denied them in the past.

In the 1974-78 Five-Year Development Plan, the SDR indicated a need for expanded educational opportunities for women, both formal and informal, and over 400,000 rural women were reported to have participated in the 1974 "literacy campaign." By 1979, approximately 20 percent of the medical students in training were women, and 27% in veterinary science; today females are increasingly being nominated as candidates for overseas training. The Ministry of Education has a special Women's Service Department which is establishing skill training centers to deal with nutrition, health, home improvements, handicraft and tailoring. By 1979, such centers had trained over 5,000 women nation-wide.

In December 1979, six women were elected to the newly-established

Parliament. Indeed, women hold important positions in government, in administration and in education, such as the Director General of the Ministry of Higher Ecucation, the President of the Somali Academy of Sciences and Arts, and the Head of the Faculty of Languages and Literature at the National University. Today women earn their own monies by working for the state or outside their homes on a scale never permitted before the enactment of the 1975 new Family Law. Not only are women reported to be receiving "equal pay for equal work," but one female informant, highly placed, indicated that "many women are actually receiving more than men because of past inequalities." And the vital role of women in Somalia's recent hostilities with Ethiopia have been everywhere acclaimed (Slottved, 1979).

With respect to traditional practices of female so-called "circumcision" and infibulation, a custom that has been universally practiced in Somalia for centuries, it appears that government opinion is strongly opposed to it, but not yet certain how best to deal with it. A commission composed of MOH, MOE, Ministry of Religion and SDWO are currently studying the issue, and appear to feel that a massive education campaign against the practice is required before a law change will be acceptable and simply confirms what many people believe to be already changing personal attitudes and practices in this matter.

In short, few governments in the world (especially neighboring Kenya) have been as definite and forthcoming as the SDR in initiating improvements in the status of women. The results have been truly impressive. The SDR is committed to a policy of full female emancipation, and women have shown their willingness to participate in the implementation

of such policies by their active involvement at all levels, especially at the local levels in the "People's Vigilante Corps" (Guulwaadayaal) which coordinates in the rural districts and villages matters relating to hygiene and welfare services. Though there are still in the rural areas obstacles to be overcome and gains to be defended, few developed countries could ask of the SDR more than it has accomplished in so short a period of time. This augurs well for the future.

Rural Women and the Bay Region Development Project

More so than other parts of Eastern Africa, women in Somalia play a vital role in rural development and, more like some West African societies, they exercise considerable economic authority. Indeed, success of the farm enterprise in most areas of Bay Region can be said to depend upon inputs from women who, together with children, are estimated to make up at least 65% of the rural population. Specific activities include the following:

1) Women make most of the household's sanitation and nutrition decisions, and manage the distribution of family milk, tea and sugar.

2) Women implement as well as participate in many of the basic decisions relating to crop and livestock production, such as joining their male kinfolk in ploughing and weeding of fields (digging of wells and underground silos is done soley by men), as well as harvesting.

3) Women have special ownership rights and management responsibilities relating to sheep, goats, poultry, ghee production, and hides and skins sales (men as well as women milk large stock and attend to the curing of hides and skins).

4) Normally, women perform the lighter cultivation tasks, such as weeding and helping in the harvest but there is no strict division of labor in this respect.

5) Though men tend mainly to work in the construction of rain-fed ponds, women normally are responsible for fetching water for household use, cutting and hauling wood for fuel and house construction, and women own and manage pack camels that are often used for these purposes, as well as used for "bunding" of fields to trap and conserve rainwater.

6) Though house construction is done mainly by women, partially assisted by men, the former are regarded as the nominal owners of the house and in recent court cases involving divorce women have inherited the house.

7) In polygynous rural families, women often act as sub-herd managers of large stock in different locations, minimizing herd risks at the cost of dispersing households. (Polygyny is the exception rather than the rule these days in Somali; although many men do take a second wife later in life, the majority of families at any one time consist of only one wife).

8) Together with fetching of water, the thresing of grains and milling of four constitute the most conspicuous work task that tend to be performed solely by women.

9) Finally, women bear, raise, care for and mainly educate the family children which are important resources for production.

As noted earlier, Bay Region and Baidoa Town are the sites for a scheduled Health Training Center being provided under the USAID Rural

Health Delivery Project No. 649-0102, which will contribute importantly to the raising of health standards in the area and women are scheduled to play an important role in this program. There are currently 62 women in the secondary school at Baidoa, of which all but one comes solely from the Bay Region; though women currently represent only 14% of the total student population in this secondary school, the ratio to men in the primary schools is said to have increased in recent years from 1:4 to 1:1.82 (MOE, 1978). Of the 25 extension trainees currently taking a four week "communication techniques" course at Bonka, one is a woman who reports no difficulties in her ability to act effectively as an extension agent. Indeed large numbers of women are both seeking and being encouraged to seek formal education in a wide variety of skills in the Bay Region.

There are, however, three areas in the Bay Region Development Project in which specific attention needs to be given to insure that women benefit more directly and equitably from its planned inputs than seem to be the case now. These are:

i) provision for separate water faucets on all head water facilities to permit women and others to gain access to clean water without having to compete with animals in troughs that are often polluted.

ii) the design or acquisition of <u>cheap</u> simple (possibly pedal-powered) threshing and milling equipment for the farm household site to aid women who are mainly responsible for these labor-intensive activities and to permit them to gain greater leisure for them that might better be spent in the care and education of their family.

iii) conscious recruiting and selection of qualified women as extension agents and as representatives. on District Crop/Livestock Advisory Committees to insure their effective participation in both planning and implementation of project goals.

Perusal of the 1977 hospital admission records in Baidoa town indicate that 43% of the total 14,783 admissions were suffering from either acute dysentary (25%) or internal parasites (18%), the two highest ranking major diseases of the region. Thus, attention to head water facilities for consumption by humans of clean water is certain to benefit women as well as the whole family. Similarly, savings in labor inputs presently made by women in threshing and milling of grains is likely to promote greater overall productivity and leisure for the whole family.

In summary, though there is progress still to be made, the role of women in Somalia is remarkably equitable among LDCs and the SDR is to be commended for policies and current practices that seem certain to insure continued improvement. The Bay Region Development Project can contribute importantly to such progress by focusing on the three recommendations noted above.

ANNEX XIV

A Managerial and Institutional Assessment of the ɔn Agricultural Development Project

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March 7, 1980

Abbreviations

ADC - Agricultural Development Corporation

BRADP - Bay Region Agricultural Development Project

FACO - Multipurpose Cooperative (Farmers Agricultural Coop)

GNP - Gross National Product

GSDR - Government of the Somali Democratic Republic

LDA - Livestock Development Agency

MLFR - Ministry of Livestock, Forestry and Range

MMWR - Ministry of Minerals and Water Resources

MOA - Ministry of Agriculture

MPW - Ministry of Public Works

NRA - National Range Agency

ONAT - National Tractor Hiring Agency

PMU - Project Management Unit

SRSP - Somali Revolutionary Socialist Party

USAID - United States Agency for International Development

USCM - Union of Somali Cooperatives Movement

WDA - Water Development Agency

Introduction

The Bay Region Agricultural Development Project has many of the attributes of an integrated rural development project, as such, the BRADP is managerially sound and should work acceptably if the problems with WDA are solved. Acceptance of the other recommendations below will add significantly to the effectiveness of the project. Equally important, with only a few changes, BRADP can make a significant contribution to the institutional development of Somalia by being its first experiment with decentralization.

Recommendations

1. Institutions Serving Crop and Animal Husbandry

Eight departments and agencies are directly involved in it and seven more indirectly. The project provides for their integration through a regional Project Management Unit (PMU).

2. Institutionalization of Decentralization

Regionally based rural development is appropriate and efforts should be made to institutionalize such decentralization in Somalia. As a device for legitimating and facilitating decentralized integration, the inter-ministerial Coordinating Committee concept should be strongly supported.

Nonetheless, additional steps will need to be taken to assure the full participation and integration of all participating organizations. A technical committee should be created at the regional level. Its function would be to coordinate between agencies and departments and to set project policies in those areas that will affect the operation of more than one unit. The committee would meet at least once a month and as called by the Project Director. Majority vote decisions of the technical committee would be binding on the project with two provisos: (i) Any matter on which either the Project Director or the Technical Manager dissent from the majority would be referred to the ministerial-level Coordinating Committee for resolution. (ii) Nothing may be undertaken to the agreements with the donors without their consent. The suggested membership of the Technical Committee is - - the Project Director; the Technical Manager; the Financial Controller; the regional heads of the MOA, Bonka Research Station, Veterinary Service, NRA, WDA and MPW; and the senior technical assistant in the region working on each agricultural extension, agricultural research, Veterinary services, range management, water and public works. Furthermore, in the spirit of multi-agency direction, the title of Deputy Project Director should be held by whomever among the Somali regional staff is best qualified and experienced, whatever his ministry or agency.

3. National Linkages

The substantial independence of the project should not lead it to neglect the importance of its remaining national linkages.

A particular problem area may be water. USAID should prompt an exchange of binding cooespondence between the WDA and the MOA, committing the WDA only to send the rigs and supporting personnel which USAID has provided to WDA for the Bay Project out of the region if and when its drilling committments there have been completed. As a first step in this direction USAID should convene a meeting at the highest level between WDA and MOA. In addition USAID should agree to use its influence and authority as the donor to assure that the drilling program be carried out on a timely basis. It is important to the success of the project that these actions be undertaken. If they are, there is an acceptably low probability of managerial failure in the water area and USAID's objectives of institutionalizing WDA's capacity will have been met. As a further aspect of this problem, all ambiguities between donors about levels and sources of support for the water component of the project must be resolved before it is approved.

4. Popular Participation

To date no provision has been made for popular participation in the project, which would add much needed information and support. Early in its life BRADP should establish a Crop and Livestock Advisory Committee in each of the four project districts. Committee members should be drawn from active crop and animal husbandmen and women.

5. Personnel

Because of the critical shortage of high-level manpower in Somalia, expatriates will have an even more direct impact on the performance of all staff then is usual. It is critical that technical assistance be provided in the form of resident staff and not short-term consultants. Only the former can provide the guidance to Somali staff and the learning from doing which are vital to the project's success.

Language will be a problem among the project staff, as Somali has not stressed English instruction. It is recommended that the equivalent of four weeks of intensive Somali language training be provided to expatriate technical assistants after work hours. Similarly, intensive English language training should be provided after work to the high and middle-level Somalis on the project who are not reasonably fluent already.

6. Remuneration

Government salaries are dysfunctionally low in Somalia but the provision of extra allowances by various donors is thretening to get out of hand. GSDR should be asked to appoint a commission to establish guidelines for maximum payable allowances for various work conditions and employment levels. If this is not possible, a guidelines policy for BRADP should be established by the inter-ministerial Coordinating Committee. Donor agencies should respect these guidelines. At a minimum, USAID should try to insure that the various agencies and departments involved in BRADP have comparable allowances.

7. Rural Outreach

Existing Somali development staff have difficulty getting out into the villages. It is important to the project that the needs for motorized transport be met but that they be kept moderate. No service arrangements should be instituted that would be rendered largely ineffective by a partial cut in motorized transportation. It should be firm project policy to have base-level veterinary and extension staff in the villages.

8. Supply Shortages

A major cause of poor administrative performance in the regions is shortages of critical supplies. BRADP should urge national agencies to budget and authorize expenditures at the start of the year for supplies which are critical and the need for which is at all predictable. The PMU should offer its own accounting services, if an accounting agent is needed, to facilitate such authorization. As water is such a critical resource, USAID should provide increased funds through BRADP to build a regional store of pump parts for WDA. The PMU also should authorize, well in advance, expenditures for supplies which are critical to the operation of its constituent units. All vehicles procured by the project should be ordered with a full complement of spare parts.

9. Inflation and Flexibility

As there are major unknowns concerning the environment of this project, it is vital that BRADP have a significant contingency fund to provide for flexible response. Such funds have been effectively eliminated by the combination of inflation and the World Bank's close budgeting. Every effort should be made to get the World Bank and its affiliates to increase their commitments to the project to take account of inflation. Failing this, USAID should consider use of some of its PL 480 Somali shillings fund to support a meaningful BRADP contingency fund.

USAID should accept the GSDR Magistrate of Accounts as the project auditing unit, subject to USAID audit review, if the World Bank provides technical assistance to it (Section 1).

Acknowledgements

This paper is based on work done in Somalia from February 17 through March 7, 1980. Over 40 interviews were conducted in Mogadishu (the capital), Baidoa (the headquarters of Bay Region), and two villages near Baidoa.

My work went unusually quickly and well, especially due to the assistance of Mohamed Warsame, the Project Director designate of the Bay Region Project. He accompanied us to the field, translated for us when necessary, secured appointments for us, and spoke his views frankly. He will do well as Director and I wish him well. Gary Nelson of USAID also was most helpful in making contacts for us and open in sharing from his knowledge and experience.

Finally, I would like to express my appreciation to Maury Sorenson and Alan Jacobs, who shared most of my travels as they worked on their own reports on the Bay Project. They were congnial, wise and helpful colleagues.

Interviews

Gary Nelson - Project Officer, USAID, Mogadishu
Mohamed Warsame Dualeh - Project Manager Designate, Bay Region Agricultural Development Project
Dr. Abrahim M. Abyan - Dean, Somali Institute of Development Administration and Management
Colonel Abshir Kahie - Bay Region Party Secretary
Omar Mohamed Hassan - Bay Region Extension Coordinator
Abdul Cadr Mahamud Warsame - District Extension Agent, Bur Acaba
Hassan Haji - Bay Region Coordinator of the Ministry of Agriculture
Mohamed Shaheed Khan - USDA Team, Baidoa
George Otey - USDA Team, Baidoa
Joseph Lopez - USDA Team, Baidoa
Mohamed Haji Yusuf - Bay Region Director of the Water Development Agency
Mohamed Ismail - Bay Region Director of the Livestock Development Agency
Adan Isah Aden - Bay Region Director of the National Range Agency
Yusuf Mohamed Hussein - staff member, National Range Agency
Musa Mohamed - Bay Region Director of the Ministry of Public Works
Sabd Ali - Bay Region Director of the Agricultural Development Corporation
Said Musiq - Regional Director of National Tractor Hiring Agency (ONAT) for Bay, Bakool and Gedo Regions
Abdi-Karim Aden Mohamed - Bay Region Cooperative Officer
Mohamed Galin Abdid - Assistant Regional Veterinary Officer, Bay Region
Mohamed Achmed Duqseh - Project Manager of the Agricultural Extension and Farm Management Training Project
Abdullahi Nur Alio - Director of Research, Ministry of Agriculture
Mohamed Ali Ahmed - Acting Director, Department of Cooperatives, Ministry of Agriculture
Dr. Abdullah Karani - General Manager, National Range Agency
David Field - Technical Manager, National Range Agency
Khalif Haji Farah - General Manager, Water Development Agency
Abdul Karim Ashur - Program Assistant, USAID
Paul Prentice, Cooperative League of USA representative
Mohamed Essa Abdi - Director of Planning and Design, Ministry of Public Works
Dr. Abdi Mahamud Elmi, Director of Department of Veterinary Service, Ministry of Livestock, Forestry and Range
Mohamed Ali, Director of Animal Husbandry, Ministry of Livestock, Forestry and Range
John Halpin, candidate for Technical Manager, Bay Region Agricultural Development Project
Richard Dudley, Deputy Director, USAID, Mogadishu

Introduction

The Bay Region Agricultural Development Project (BRADP) involves the departments and agencies of four ministries of the Somali Democratic Republic. It effect, if not in name, it is an integrated rural development project, with all the inter organizational complications that integration inplies. To add to the complexity, the project is funded from five sources in three distinct administrative groups - - the African Development Fund, the International Development Association, and the International Fund for Agricultural Development, administered by the World Bank; the U.S. Agency for International Development (USAID); and the Government of Somalia (GSDR). Given such a large number of independent organizational actors, administrative difficulties are inevitable unless they are given careful attention even before the project begins.

Institutions Serving Crop and Animal Husbandry

BRADP involves the departments and agencies of the Ministry of Agriculture, the Ministry of Minerals and Water Resources, the Ministry of Public Works, and the Ministry of Livestock, Forestry and Range. Each is headed by a Minister, aided by an Assistant Minister. Both attend Cabinet meetings and are members of the newly elected People's Assembly. Ultimate authority resides with President Siad and the Political Bureau of the Somali Revolutionary Socialist Party (SRSP), but ministers enjoy considerable discretion in setting policy in their respective domains. Assistant ministers do not have any decision making authority, but have influence as advisors to their ministers. Responsible to each minister is a director-general, who is the chief civil servant in the ministry. Directors of ministerial departments report to the director-general. In addition to the line civil service, however, three of the ministries involved in BRADP more one or more semi-autonomous agencies, headed by general managers who are responsible directly to the minister. Director-generals have no authority over these agencies, although they do have influence on policy matters which concern them by providing the staff support and policy advice to their ministers. Director-general and agency general managers thus have a competitive rather than a hierarchical relationship, much like that of le chef de cabinet and le directeur in the French civil service.

In the Ministry of Agriculture (MOA) only the Departments of Extension and of Research have a direct involvement in BRADP. The latter has a station at Bonka, just outside of Baidoa, which will provide adaptive research to the project. The Extension Department is to provide trained agents to BRADP. In effect this department

has been taken over by the Agricultural Delivery Systems Project (funded by USAID as 649-0112). The Project Management Unit for that project is responsible to the Director-general of the Ministry of Agriculture, and so retains a status similar to that of a department. Agriculture's Department of Cooperatives is not directly involved in BRADP but provides services that are relevant to it. GSDR favors a cooperative approach to farming. Many farmers in the Bay Region belong to Multipurpose Cooperatives (FACOs), which share marketing, storage, and other facilities, some farmers also belong to Group Farms, which engage in state supported collective production and which are constituent units of the FACOs. The Department of Cooperatives provides auditing and organizational guidance to both types of cooperatives, albeit inperfectly. This department is scheduled to be transfered from the Ministry of Agriculture to the Union of Somali Cooperatives Movement (USCM), at which point it could become an independent actor.

Two semi-autonomous agencies which come under the Ministry of Agriculture, are not directly involved in BRADP, but are relevant to it. These are the National Tractor Hiring Agency (ONAT), which is responsible for the provision of all agricultural inputs except seeds, and the Agricultural Development Corporation (ADC), which is responsible for the marketing of food grains and seeds. The ADC has an extremely good record of getting to the farmers to purchase and move their food grains. Its prices have become increasingly competitive in recent years, although its 50% mark-up between farmer and miller shows a need for gains in efficiency. One part of the problem may be in storage losses, which the regional ADC reported at approximately 10% of the crop. The Bay Region farmers have the capacity to store food grains themselves for up to 8 years. Several informed observers believe the traditional system has low spoilage rates; so the farmers are not forced to sell. They have shown themselves to be quite price responsive, thus the efficient operation of the ADC is important to the success of BRADP.

The National Tractor Hiring Agency (ONAT) controls the importation of farm inputs and their distribution to farms, often through other government agencies. The organization is quite ineffective and has not provided any inputs, save tractors, in the Bay Region for two years. The absence of high quality hoes is a major constraint on agricultural development in the area. ONAT's remaining area of real activity in the regions is tractor hires. (For the record, ONAT precedes the 1969 Revolution and is not a creation of Soviet aid). The agency has 15 tractors in Bay Region and the FACOs have a few more. These are rented both to private and cooperative users. This picture will change dramatically in the near future as it is understood that the Government of Iraq

has agreed to provide Somalia 5,000 tractors through ONAT over the next 5 years. It is not known what the implications of this will be, for it is unclear how operating and maintenance expenses are to be met. Bay Region does have a land surplus and a labor shortage but it seems likely that the removal of the labor constraint at plowing will only create other severe labor constraints at later stages in the production cycle. Whatever the situation with respect to tractors, BRADP will need to either break ONAT's control on other imported inputs or improve its effectiveness in this function.

The Ministry of Livestock, Forestry and Range (MLFR) will have its Veterinary Service Department and the National Range Agency (NRA) directly involved in BRADP. The NRA is responsible for management of range reserves, fodder production and the maintenance of water points in range areas. Under the Range Act its approval is required for any rural borehole, in order to try to protect the range. The NRA lacks the technical staff to perform these tasks adequately at present, but the USAID Central Rangelands Project (649-0108) will provide some of the needed training. Both the NRA and the Veterinary Service are scheduled to receive additional technical assistance, training and support through BRADP.

The Department of Animal Husbandry of the MLFR may be relevant to BRADP, although it is not currently involved. The Department has no program or staff in Bay Region at present. It does have qualified junior staff already, however, and an operating training program. The Department's staff and program capabilities thus might be used in BRADP's livestock program to compensate for NRA's current weaknesses.

The Livestock Development Agency (LDA) of the MLFR will have an indirect inpact on BRADP, as it purchases livestock in the area. Its prices are reputed to be competitive, and it reports that it moves about 25,000 head of cattle a month out of the Bay Region in the wet seasons. It can not purchase or move cattle in the dry months as there are inadequate watering points along the overland stock driving route.

The Ministry of Minerals and Water Resources (MMWR) will be involved through its Water Development Agency (WDA) and possibly through its Geological Survey Department. The two are currently contesting which will control the technical expertise and data for water mapping. The WDA is becoming the sole source of well drilling capacity in Somalia, in part because of USAID decisions in the Comprehensive Groundwater Project (649-0104). Some, but not all, of the resources needed for the BRADP drilling program have been provided by USAID directly to WDA under that project (649-0104).

The Ministry of Public Works (MPW) will be directly involved in BRADP through its Highways and Mechanical Engineering Departments. The former is responsible for the construction and maintenance of roads; the latter, for the maintenance and repair of mechanical equipment (especially vehicles) for all government agencies. Both are scheduled to receive technical assistance, training and support through BRADP.

The regional administration is headed by a Governor, who also is Regional Secretary of the Somali Revolutionary Socialist Party (SRSP). Formally governors are appointed by and resposible to the Minister of Local Government and Regional Development. Party secretaries, however, are appointed by the Secretary-General of the SRSP, who is President Siad. In practice then, regional governors are responsible and have a line of communication to the President. In addition to many other functions, the governor's office collects local taxes, arranges for the payment of GSDR staff in the region, and serves as overall accountant for the government departments. The Governor has his counterpart in District Commissioners in each of Bay's four districts. They serve as well as District Party Secretaries and are responsible to the Regional Secretary. The Regional and District Party Secretaries provide general oversight and coordination to all GSDR activities within their areas. Staff are expected to obey their instructions if they are not in conflict with the directives of their respective national headquarters. The Regional Secretary frequently brings together regional officers to arrange for cooperation between them. This is usually done on a consultative, mediating basis and only rarely to give commands. These meetings are ad hoc as to timing, membership and agenda. Rarely if ever, is the collectivity of regional officers convened.

There are Regional and District Committees of the SRSP. The Regional Committee has 16 members, comprised of the Regional and District Party Secretaries, the army unit heads in the region, some heads of government services, and citizen representatives from the District Committees. The Party Committees have a role to play in the setting of local development policy, but it is unclear whether or not they meet frquently to do so.

Regional and District elected Local Governments are now in the process of formation. The District Local Governments have been established in Bay Region but the regional unit is not yet in existence. It is uncertain when it will be. They are being resurrected, now after having been laid down in the 1969 Revolution. It is unclear what their full functions will be, but before 1969 their jurisdiction was confined to matters they could finance out of their own tax revenues. It is unlikely that these Local Governments will, could or should play a direct role in BRADP.

Finally, the Magistrate of Accounts is the GSDR agency responsible for government auditing. It has an office in Bay Region and has been accepted by the World Bank as the auditing unit for BRADP. This unit has a reputation for high integrity and professionalism. USAID should accept it as the project auditing unit, subject to USAID audit review, if the World Bank provides technical assistance to it.

Institutionalization of Decentralization

Eight departments and agencies are directly involved in BRADP and an additional seven will have an impact on its performance. This is an unusually large number, even for an integrated rural development project. It reflects the organizational proliferation which is a distinctive feature of the GSDR.

Cooperation between agencies and departments typically is poor at the national level in Somalia. The President and the Politburo are decisive but do not actively promote integrative policies. Individual ministers sometimes find it difficult to control politically influential general managers of agencies under their jurisdiction. (The recent replacement of some technocrat ministers by politically powerful ones may change this).

In the regions and districts cooperation between the agencies and departments appears to be fairly good. Field officers seem to know one another and to meet informally when appropriate. The Party Secretaries provide additional coordination as it is needed. Few and inadequate resources are fully controlled at the field level, however, so this local cooperation has a relatively limited impact on the character of GSDR operations.

BRADP is Somalia's first real attempt at integrated rural development or at regionally-based decentralization. Such an approach is overdue. As already mentioned, inter-agency cooperation is better at the local level. Also, relatively little is actually known about how to undertake rural development in Somalia. Regionally controlled development will have better feed-back from field realities and will provide for a quicker and more appropriate adaptation to local conditions. Regionally based rural development is appropriate and efforts should be made to institutionalize such decentralization in Somalia.

The Project Management Unit (PMU) which the World Bank has negotiated for BRADP represents a big, first step toward decentralization and toward the assurance of inter-agency cooperation. In effect the PMU is like a regional development corporation. As the World Bank has proposed it, BRADP would be controlled at the regional level by a Somali Project Director and an expatriate Technical Manager (with the assistance of an expatriate Financial Controller). The Project Director is to be appointed by the Ministry of Agriculture and the PMU falls under its authority. Under the law establishing it, the PMU is subject to the authority of the Minister of Agriculture and to an inter-ministerial Coordination Committee. See Appendix_--- for the law. The function of the Committee is to assure the cooperation of the relevant ministries by giving them a voice in the control of project policy. Such direct ministerial attention would not be replicable if more regional development corporations were to be created in Somalia, for they would not have the time or the interest to attend to a large number of them. Nonetheless, such a ministerial committee is desirable and essential at this stage to permit and institutionalize the concepts of decentralized development and inter-agency cooperation. The Inter-ministerial Coordination Committee concept should be strongly supported.

The membership of the Coordination Committee as presently constituted is - - the Minister of Finance, the Minister of Agriculture, the Minister of Livestock, Forestry and Range, the Minister of Mineral and Water Resources, the Minister of Public Works, the Minister of State Planning, the Regional Governor (Party Secretary), and the Project Director. (The Ministers of Public Works and of National Planning are missing on the English translation of the law. Their participation is important. Assurances have been given that this was a translation error and that they are included in the official, Somali version.

The World Bank Staff Aoorausak Report (No. 2406a-SO) envisages that full department and agency cooperation will be assured by two further devices - - (1) the passage of a law seconding the regional staff of the relevant GSDR units to BRADP, and (2) giving the PMU full control of the project's financial resources, thus rendering participation by other units irresistable. For a wide variety of reasons, these two devices are inadequate. (a) A substantial proportion of the funds necessary for BRADP water development already have been provided directly to the WDA by USAID (649-0104). (b) The secondment to the project of staff in Bay Region does not assure that the agencies and departments concerned will assign adequate numbers or quality of staff to the region. Some of the agency heads do not regard the ministerial level coordinating committee as capable of detailed enough involvement to project its policy concerns. (c) Secondment does not assure that important national support services, which are not funded under the

the project, will be forthcoming. Both (b) and (c) are likely to be problem areas if other ministries and agencies feel that inadequate attention is being given to their policy concerns in operational decision-making and that the project instead is a Ministry of Agriculture preserve. Concerns of this nature have already been expressed by some of the organizations. (d) A Ministry of Agriculture controlled regional, integrated development project will do little to institutionalize inter-ministerial cooperation and decentralization.

To deal with problems (b)-(d) immediately above, the base of operational decision-making for the project should be broadened beyond the Project Director and Technical Manager. A Technical Committee should be created at the regional level. Its function would be to coordinate between agencies and departments and to set project policies in those areas that will affect the operation of more than one unit. The Committee would meet at least once a month as called by the Project Director. Majority vote decisions of the Technical Committee would be binding on the project with two provisos. (i) Any matter on which either the Project Director or the Technical Manager dissent from the majority would be referred to the ministerial-level Coordination Committee for resolution. (ii) Nothing may be undertaken contrary to the agreements with the donors witnout their consent. The suggested membership of the Technical Committee is - the Project Director; the Technical Manager; the Financial Controller; the regional heads of the MOA, the Bonka Research Station, Veterinary Service, NRA, WDA and the MPW; the senior technical assistant in the region working on each of agricultural extension, agricultural research, veterinary services, range management, water, and public works. Other heads of regional agencies and other technical assistants should be invited to attend as non-voting members when matters relevant to them are discussed. In fact, it probably would be desirable to expand the committee to include the regional heads of the ADC, ONAT, LDA, and USCM, as their activities will have an impact on the project.

The proposed Technical Committee would have several short-term and long-term benefits. (1) It would cause a wide range of policy perspectives to be brought to bear on the project, assuring that the rural development is meaningfully integrated. (2) Such a committee would diffuse the fears of other agencies and assure their wholehearted participation in BRADP. Several of them have said that representation on a regional committee would meet their concerns. (3) The proposed membership and procedural roles for the Technical Committee would build both a team approach and commitment among regional staff, while also giving the Project Director and Technical Manager adequate protection for their authority. (4) The committee would begin the important process of institutionalizing a structure for providing regular, decentralized coordination to rural development. Other socialist states in Africa have a similar committee of field agency heads, which prepares plans for discussion and approval by the local political authorities. The Coodinating Committee/Technical Committee combination represents a significant first-step in

institutionalizing decentralization and is as far as it is realistic to go in Somalia, on the project, at this time.

In the spirit of multi-agency direction, the Regional Coordinator of MOA should not be automatically designated as deputy project manager. This title should be held by whomever among the Somali regional staff is best qualified and experienced whatever his minority or agency.

National Linkages

GSDR expertise and decision-making are concentrated in the capital of Mogadishu at present. Despite this centralization, donor agencies do not appear to have had too much difficulty in gaining consent for the decentralization of control over staff and programs to the regionally-based PMU. The danger now may not be centralization but weak support from the national units.

The agricultural component is dependent on the national Agricultural Delivery Systems PMU for the supply and training of its extension agents. The range program will need some of the newly trained staff of the NRA. The regional Veterinary Service requires some national laboratory facilities and logistical support for medical supplies. It also has received qualified temporary staff in the past when its one veterinarian has gone on leave. The roads program must use the national laboratory of the Ministry of Public Works for soils testing. The success of the regional water drilling program depends on the provision of geologic and hydrologic expertise and data from Mogadishu. By law all veterinary medicines have to be ordered through the national Department of Veterinary Service. Further areas of linkage are likely to be desirable as the project progresses.

BRADP enjoys nearly complete autonomy and control of most of the fiscal resources which it will require. The substantial independence of the project should not lead it to neglect the importance of its remaining national linkages. The Coordinating Committee structure is designed to facilitate the maintenance of those ties and will work well with a modicum of effort by the Project Manager.

The one area in which national/regional linkages are of extreme importance and on which work must be done before the project begins is water development. USAID is financing a large portion of this component of the project. BRADP is to receive $3.3 million from all sources for the water program but the balance of $3.1 million has been provided by USAID to the WDA under the Comprehensive Groundwater Project (649-0104). The WDA funds are for drilling rigs and expatriate technical assistance. The BRADO funds are for the operational costs of drilling and establishing wells and for training. The WDA is bound under its project paper to provide to the Bay Region the number of wells that BRADP is scheduled to receive and it cannot finance its full drilling program without the BRADP funds.

The NRA has consented to a similar arrangment with the WDA for its Central Rangelands Project (6490-0108). The General Manager of the NRA consented to the arrangement and is not dissatisfied with it yet, although it is still too early to judge its adequacy.

The Project Manager, Designate of BRADP, is not satisfied with such a dependence on the WDA. He argues correctly that the WDA has had a checkered record of fulfilling its commitments in the past and that Somalia does not have a good record of inter-agency cooperation. He is afraid that the WDA might delay in meeting its drilling program or that it might transfer its rigs out ot the Bay Region.

USAID Mogadishu is the initiator of this arrangment. Its commitment to the WDA is based both on institutional development considerations and a conviction that only a nationally-based organization can have the concentration of various technical experts and data sources to give the drilling program a high rate of success. For the development of Somalia it is desirable to create at least one agency with a high level of technical capability and a growing knowledge of the geologic and hydrologic characteristics of Somalia. The continued support of ad hoc, fragmented drilling operations will not do this. The fact that the Federal Republic of Germany has recently agreed to provide the WDA with 12 technical assistants will increase the concentration of expertise and capability those even beyond that which USAID support will provide. An organization with a high level of competence, such as the WDA seems likely to achieve, will have a higher success rate in its drilling operations and thus will be more efficient. To support both BRADP and WDA USAID has created a matrix organization between them, with resources and commitment from both necessary to success.

The concern of the BRADP Project Director and the objectives of USAID are both valid and a way to meet both has been sought. USAID should prompt an exchange of binding correspondence between the WDA and the MOA, committing the WDA only to send the rigs and supporting personnel which USAID has provided to WDA for the Bay Project out of the region if and when its drilling commitments these have been completed. As a first step in this direction USAID should convene a meeting at the highist level between WDA and MOA. In addition, USAID should agree to use its influence and authority as the donor of the necessary resources to WDA to assure that the drilling program is carried out on a timely basis. It is important to the success of the project that these actions be undertaken. If they are, there is an acceptably low probability of managerial failure in the water area and USAID's institutionalization objectives will have been met. The Project Manager continues to have worries about this arrangement but is willing to give it a trial. It is sufficiently desirable that GSDR gain confidence in these kind of inter-agency relationships for

the moderate risk to be taken. USAID should monitor the relationship carefully, however, and be prepared to take corrective action if it fails.

Some important confusions about levels and sources of support remain between and within the World Bank Appraisal Report and the USAID Comprehensive Groundwater Project Paper and the USAID Project Identification Document for BRADP. These cannot be resolved without the table which gives the detailed break-down of project expenditures as they are allocated between donors. The World Bank document gives the expenditure detail and the allocation of donor commitment by broad functional categories. The needed table is missing, however. This table must be obtained. All ambiguities about levels and sources of support for the water component of the project must be resolved before it is approved.

Popular Participation

To date no provision has been made for formal popular participation in BRADP implementation decisions. Although the GSDR has a commendably progressive policy stance and although it provides for participation through the SRS Party, membership in the party is low in the rural areas. (In 1977 only 735 of the SRSP's 12000 members were classified as peasants). Elected District Local Governments are now being formed but they are not designed for participation at the base level in projects such as BRADP. The absence of popular participation in BRADP does not seem desirable. The project is operating in an environment about which it has scant technical and sociological information. Not only should inhabitants have some right to shape the way a project affects them, farmers can provide essential insghts for the project and are more likely to make the necessary commitment to it if they are involved. USAID is mandated by Congress to encourage participation. More important, it probably is necessary to the project's effectiveness in meeting USAID's target group of the rural poor.

Early in its life, BRADP should establish a Crop and Livestock Advisory Committee in each of the four project districts. Committee members should be drawn from active crop and animal husbandmen and women. Both types of producers as well as both sexes need to be represented. Female representation is common and accepted in Somalia. Given the national political control of the project and the infant state of these participatory committees, they should be advisory only during the life of BRADP. They might achieve greater authority later. District committees rather than a regional one are suggested because - (a) It is important to consider the different characteristics and opportunites offered by the four districts. (b) Distances and transportation problems are too great for regular re-

gional meetings. (c) A regional committee is likely to become too large. A size of about 15 would be best. Above that number, officials are more likely to talk at rather than with farmers. (d) A fuller range of producers is more likely to be represented on a more local committee.

The way in which membership on these committees should be defined and selected will have to be determined once the project is underway. Too little is known about the existing social and organizational structures in the area to make an informed decision at this point. Selection through the cooperatives is one possibility but it should be explored cautiously first. Most of the cooperatives are extremely dependent on GSDR support at present. Some information collected in Bay Region suggests that some co-ops may be dominated by local elites and used to funnel GSDR resources to their own benefit. BRADP would not wish to reinforce such a pattern in its Advisory Committee structure, especially as it is inconsistent with GSDR policy objectives.

On the other hand, it is desirable that agricultural and livestock extension take place through groups of producers rather than with key farmers only. Experience elsewhere in eastern Africa suggests that extension to groups is both more effective and less regressive than is extension to individuals. This remains a matter for development in the course of the project. Such group work is critical to the project's actually reaching the USAID target of the rural poor.

It is desirable that crop and livestock producers develop a more extensive organizational structure, in order to represent their insights and interests and to receive services of all types. Crop and [illegible] committees has been used elsewhere in Africa and can represent on important step in developing more effective participating structures.

Personnel

Development administration in the Bay Region is weak, for it suffers from severe constraints. Somalia has a great shortage of trained manpower and some of what it does have has been enticed away by lucrative jobs on the Arabian peninsula. Material resources of all kinds are also in short supply in this, one of the poorest countries in the world. (The per capita GNP for 1978 was $110) yet the administrative potential of the GSDR in Bay Region is greater than what has been realized to date. Many of the intermediate level trained personnel that do exist are underutilized. The material resources they need to do their jobs with are unavailable at present and they sometimes are caught in unnecessary red tape from their national headquarters. An infusion of material and technical support from BRADP and a decentralization of some decision-making to the regional level will quickly release this underutilized potential.

A survey of the existing development services in the Bay Region reveals a large number of problems. There are a fair number of middle-level technicians and semi-skilled workers, many of whom appear to be quite competent. The supply of middle-level staff is still inadequate. Those already there are not being fully utilized, however, in part because they lack the supporting supervision and advice of high-level technicians. High-level personnel are almost totally absent in the regional development agencies. The only Somali University graduate encountered there was a veterinarian.

The shortage of middle-level technicians will be eased by the training component of BRADP and of three other USAID supported projects -- Agricultural Delivery Systems (649-0112), Central Rangelands (649-0108), and Comprehensive Groundwater (649-0104). BRADP will deal with the shortage of high-level technicians in the short-run by providing technical assistance and in the long-run by training for Somalis in the United States.

It is critical that technical assistance be provided in the form of resident staff and not short-term consultants. The latter alternative will be tempting to some, as Baidoa - the capital of Bay Region - is not a comfortable post. Only resident technical assistants can meet three of the basic needs of the Region, however. The first is for day-to-day support, advice and supervision for middle-level staff. They cannot be fully effective without it and in the short-run only technical assistance can provide it. The second need is for the development and installation of effective systems of operation for development agencies and departments. Such institution building cannot be done on an in-and-out basis. The third need is for the creation of the information upon which consultants base their advice. The knowledge base on the production and water systems of the Bay Region is quite limited. The success of BRADP will depend on intelligent trial and error learning. Only resident staff will have a sufficient time horizon to learn from the project's successes and failures.

Full utilization of the technical assistants and trained Somalis will require attention to language problems. High-level training is to be provided in the United States and technical assistance personnel will be English speakers. A fair number of Somalis speak English but it was not the language of instruction or colonial administration for most of the country. Only a minority of the middle and high level staff assigned to the project will be reasonably fluent in English and these will tend to be the older ones. If this problem is not addressed, two dysfunctions will follow. (a) The competence of some trained Somali staff will be wasted by their becoming permanent interpreters. (b) The older staff with more seniority and English will be retained to work with the expatriates, while the Somalis fresh out of school will be sent to the U.S. for English instruction and further training. This would be poor for morale and wasteful of resources. To avoid these problems, it is recommended that the equivalent of four weeks of intensive Somali language training be provided to expatriate technical assistants after work hours and that intensive English language training be provided after work to the high and middle-level Somalis on the project who are not reasonably fluent already. It is important to remember that Somalia isvery proud of its language and that two of the most important accomplishments of the revolution were the acceptance of a written form for it and the mass literacy campaign.

Remuneration

The salaries paid to civil servants throughout Somalia are extremely low. An extension agent in Bay Region receives a salare of S. Shs 450 a month and can count on another S. Shs 90 in field allowances, a total of US $90 a month. The national General Manager of the Banana National Agency, for example, receives a salary and allowances of $650 a month. As low as this is, it is higher than the income of the highest civil servant in a ministry, the director-general. There is unusually strong agreement among Somalis that these pay levels are below an acceptable standard of living at each status level. The consequences are three: (1) Many Somalis leave for the Arabian peninsula. (2) Most civil servants work a 4, rather than the official 7, hour day, often holding an illegal second job. (3) Corruption has increased, although it still appears to be less than in West Africa.

It is extremely difficult for the GSDR to solve this problem itself. It cannot afford a significant increase in salaries without decreasing government employment, and it is unable to pay the political costs of significant lay-offs. Somalia's Ministry of Personnel assigns all new secondary graduates to their jobs in the public and private sectors. The GSDR is unlikely to be able to stop being employers of last (and often first) resort. Perhaps a GSDR declaration that all jobs are half-time would relieve political pressures; improve public morality by legitimating reality, and make possible the incentive of significant increases via full-time employment for a limited percentage who are judged most

productive. Such a change is beyond the scope of this paper and project, however.

Many international aid agencies have responded to this situation by topping-up salaries or allowances. USAID has refused to pay increased salaries, arguing that increases should be a matter of GSDR policy for the civil service as a whole. USAID has agreed to the supplementation field allowances, however. There are great advantages to this. Such allowances are paid for time in the field and so provide a direct, variable and controllable incentive for difficult and uncomfortable work. These allowances sometimes are so substantial that they amount to the equivalant of a salary jump. The Agricultural Delivery Systems (649-0112) project manager proposes to pay extension agents Shs 800/- to 1,000 a month for residing in a village and to provide housing as well. Simply, the cash allowance would produce a 150% increase over current agent income. Most Somali commentators speak of 50% as the minimum increase needed and 100% as just. The proposed extension agent benefits package, which would apply to BRADP as well, would provide a higher level of remuneration than Kenya does. As Somalia is a poorer country and has a socialist commitment, it is unlikely that such a level is sustainable or is consistent with GSDR policy. Out of respect for Somalia socialism, GSDR should be asked to appoint a commission to establish guidelines for maximum payable allowances for various work conditions and employment levels. If this is not possible, a guidelines policy for BRADP should be established by the inter-ministerial coordinating committee. It should be accepted that these are maxima for allowances and that they will be paid only where GSDR or foreign aid funds are made especially available for them. Donor agencies should respect these guidelines. Otherwise GSDR's civil service salary structure will be irreparably fragmented, inter-ministerial rivalries will intensify, civil servants will constantly shift between projects, and the eventual institutionalization of internationally-funded projects will be all but impossible. USAID should try to insure that the various agencies and departments involved in BRADP have comparable allowances [illegible]. Otherwise, inter-organizational cooperation will be difficult to maintain.

Rural Outreach

Government staff in Bay are concentrated in the regional and district capitals and lack sufficient vehicles and fuel to get into the field very often. They must work by sitting in their offices. In unannounced visits to ten regional development offices, the director was in to receive us, not out in the field, in all but one case.

The staff consequently have penetrated the rural areas for a limited distance and to a limited depth only. Bay Region development staff were unsure of district boundaries, probably because they rarely are able to reach the outer limits of their formal jurisdictions.

Part of the solution to the problem of poor outreach is the provision of vehicles and fuel. BRADP has moderate provisions for this need, and as part of its support to the project the Agricultural Delivery Systems project (649-0112) has already decided to provide motor-scooters to extension agents. (Bicycles are not used in Somalia and the distances agents have to cover are great.) It is important that the needs for motorized transport be met but that they be kept moderate. Somalia does not produce oil, has a trade deficit, and has difficulty meeting its government budget. Although Somalia seems assured of substantial foreign aid for some time, provision should be made for eventual declining levels of support. Experience elsewhere suggests that one of the first areas for budget cuts will be vehicles and fuel. No service arrangements should be instituted that would be rendered largely ineffective by a partial cut in motorized transportation.

BRADP is scheduled to build 13 new veterinary dispensaries and to restock 17 existing ones at the village level. The Agricultural Delivery Systems project, which will provide extension staff to BRADP, also currently proposes to house agents in the village areas they will serve. It plans to build staff housing in the rural areas and to provide generous field allowances to agents for living there. This is sound policy. There will be considerable pressure from veterinary and extension staff to be located in district and regional headquarters. If they are, they will spend too much time traveling when there is transport and be immobilized when there isn't. In neither case will they know the crop and animal husbandmen well. It should be firm project policy to house base-level veterinary and extension staff in the villages. To make this policy palatable, generous field allowances -- within government guidelines -- should be paid, and primary school teachers, extension agents, veterinary assistants, and the projected health assistants might be concentrated to the extent possible in village centers. The latter policy would require some inter-ministerial planning at the regional level on the location of rural service centers.

Supply Shortages

Critical supplies for maintenance also were generally short in Bay Region. The regional Water Development Agency frequently must leave a life-sustaining pump broken for a week while its staff obtains the parts in Mogadishu. The roads staff of the Ministry of Public Works is frequently idle for lack of equipment. Only the regional Veterinary Office seemed to be fairly well supplied.

In good part the supply shortages and delays are caused by a scarcity of resources. National ministries and agencies lack sufficient funds to meet all the demands made upon them. They respond by hoarding resources; making the regions justify each demand and rationing through the ever lengthening time each supplicant spends in the queue. Although this strategy has its rationale for the center, it is wasteful of resources in the regions and districts. Critically needed facilities, such as bore holes, spend unnecessary time out of order, and regional staff sit idle or spend time pursuing authorizations in Mogadishu.

This problem will be partly solved by the increased resources made available through the project and by their control by the Project Management Unit in Baidoa. Some critical resources will be controlled by other spending agencies, however. BRADP should urge national agencies to budget and authorize expenditures at the start of each year for supplies which are critical and the need for which is at all predictable. The Project Management Unit should offer its own accounting services, if an accounting agent is needed, to facilitate such authorization. A regional fiscal control unit will always be able to respond more quickly and sensitively to regional crises than national ones can.

An area of particular concern is the maintenance of a regional parts store for the WDA, as continuous water supply is such a vital resource. USAID should provide increased funds through BRADP to build such a regional store of pump parts. National WDA has agreed to cooperate in supplying such a store if the funding can be provided.

The other part of the solution to the supplies problem lies with BRADP itself. The PMU also should authorize well in advance, expenditures for supplies which are critical to the operation of its constituent units. The lead time necessary to obtain each critical item should be identified, inventories compiled, and use rates carefully monitored so that the time for reordering can be identified easily. The institutionalization of such procedures in the constituent units of BRADP will build administrative capacity in the region. Finally, to avert later problems, all vehicles procured by the project should be ordered with a full complement of spare parts.

Inflation and Flexibility

In all projects unanticipated needs arise during the course of implementation. This is even more likely to occur in BRADP, as the knowledge base was limited in the design phase. The funds needed for expenditure on unanticipated problems and opportunities generally is not large relative to a whole project but the return on [illegible] extraordinarily large. It is vital that BRADP have a significant contingency fund to provide for flexible response.

This flexibility has been severely threatened by the extreme paring of estimates done by the World Bank appraisal team and the pace of Somali inflation. There is wide agreement that a significant proportion of the estimates are quite unrealistic. The deficits probably cannot be made up even by using exclusively for this purpose the World Bank contingency and inflation allowances. Not only does this threaten planned activities; it threatens the vital flexibility of the project as well. Every effort should be made to get the World Bank and its affiliates to increase their commitments to the project to take account of inflation. Failing this, USAID should consider use of some of its PL 480 Somali shillings fund to support a meaningful BRADP contingency fund.

Conclusion

By and large BRADP is managerially sound and should work acceptably. The only problem that must be solved to make the project viable is the relationship between WDA and BRADP. Recommendations are provided in the text which should achieve this and which seem viable given the positions of the major actors.

Beyond the WDA recommendations, a series of suggestions are made which will provide for more effective operations. As important, however, are the recommendations to bend the structure of the project slightly so as to improve its prospects of making an institutional contribution to Somalia. Suggestions are made to keep levels of remuner tion within plausibly sustainable rates and to begin to institutionalize decentralization and popular participation. Particularly if these suggestions or ones similar to them are followed, BRADP can make a significant contribution to the institutional development of Somalia.

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ANNEX XV

DATA COLLECTION

I. IDA/IFAD financed activities.

II. AID financed activities.

Land Use, Vegetation and Land Capability Survey. This is a major survey that must parallel the Phase I Project to provide the base data necessary to confirm that the areas selected for the pilot studies adequately represent the entire Bay Region and prepare phase two of the project. Existing studies of relevance include:

- Agriculture and Water Surveys; Lockwood Survey Corporation/FAO Rome 1968 which includes a series of 1:500,000 and 1:60,000 scale soil maps.

- Existing air photography at the scale of 1:60,000.

- Existing photo mosaics.

Inter Riverine Agricultural Study; Hunting Technical Services Limited; Maps, September 1977; Final Report November 1977.

1:100,000 scale topographic and land use maps compiled by the Russians.

It is essential that consultants engaged for the land use, vegetation and land capability survey have full access to all the above information and have the capability to carry out the required work under the supervision of PMU, but independently of Project personnel and the various GOS ministries, departments and agencies, all of whom would be heavily committed throughout the study period. The main thrust of this survey should be directed towards reviewing all currently available relevant data, describing a schedule of field work to close identified gaps relative to the attainment of the following objectives:

(a) The preparation of a base topographical map showing all roads and tracks, towns, villages, water supplies, bridges, fords, other pertinent physical infrastructures, district and regional boundaries and rainfall isohyets on a 1:250,000 scale. Much of this is already available from the new Russian maps but some additional information such as a legend which indicates not only the standard of roads and tracks but also in which months of the year each section of these are open to conventional motor vehicles, motor cycles, animal-drawn carts, animals with riders, and the trekking of animals. Traffic densities and an indication of travelling times between key locations by mode of transport, and month of year. Water points by nature, water quantity, quality, and the months, if any, in which each is likely to run dry.

(b) The preparation of a detailed vegetation map that pays particular attention to pasture and browse species and bush cover - virgin, regrown, height and density expressed in terms of the ease with which it can be penetrated by camels, cattle, goats, sheep and humans on a 1:250,000 scale. It should also be backed by: a herbarium of key species; the major ecological groupings of plant species that exist; the more readily identifiable changes that occur within each of the ecosystems identified as a result of modest, heavy and overgrazing, clearing and regular or spasmodic cropping.

(c) The preparation of a detailed land use map using several categories to reflect the observed spectrum of current usage under each of the following broad headings: regularly cropped arable rainfed areas by crop type(s); spasmodically cropped arable rainfed areas by crop type(s); cropped irrigation areas by crop type(s); livestock grazing or browsing by carrying capacity (hectares per livestock unit) at a scale of 1:250,000 and backed by relevant descriptions of the crop farming system(s) involved, the crop husbandry practices used; the yields obtained per hectare and growing season; use of livestock within crop areas; types of livestock within cropped and non-cropped areas.

(d) The preparation of a land capability map at a scale of 1:250,000 which uses several categories to reflect the degree of suitability for land uses within each of the following broad headings: regular arable rainfed cropping by likely crop types; spasmodic arable rainfed cropping by likely crop types; irrigable potential and possible crop types; livestock grazing of improved pastures by likely pasture composition and carrying capacity; livestock grazing of native pastures with the potential for (i) low-cost extensive improvement via the introduction of more productive plant species following bush clearing, without bush clearing and with or without any soil conservation; (ii) low cost extensive improvement through bush clearing with or without any soil conservation; (iii) improvement through better grazing management of the existing resource with or without any soil conservation. All identified categories should be based on the assumption that adequate road access and supplies of suitable quantities of appropriate quality water can be made available and backed by sufficient supporting documentation for each land capability category finally delineated to ensure the map can be interpreted by subsequent readers with regard to: the type of farming and/or grazing management system(s) that the study team assumed would be used; the levels of productivity (crop yields, carrying capacities and animal off-take rates) that the study team assumed it would be possible to realize; and the associated levels of inputs the study team assumed would be used. In so doing, the study team would be closely supervised by the Project Technical Assistance team to ensure their final conclusions are consistent with the proposed adaptive research and field trial work plan of the Project.

(e) The preparation of Project mid-term review report for the PMU specifically geared to: (i) the land use, vegetation and land capability of the PADUs and the extent to which these can be regarded as representative of the entire Bay Region; (ii) a preliminary reconnaissance of all newly identified land systems with the potential for rainfed agriculture including a comparison of these with existing rainfed cropping areas; (c) a detailed survey within the Limestone Depression to specifically identify and substantiate any potentially irrigable areas for which the Water component of the Phase I study has established the availability of adequate quantities of irrigation water; (d) a tentative master plan of the entire Bay Region at a scale of 1:250,000 showing: the location of potential water point sites within the cropping area and the geographical boundaries and areas of crop land that each of these water points would service; the associated demand for a rangeland area to accommodate those livestock which are owned by families that work each crop land area but cannot be carried on the crop land and the size and geographical location of such rangeland areas.

42. A total input of 6 man-years of consulting is allowed. This would embrace a multi-disciplinary team of specialists to provide expertise in ecology, soils (land-systems,-use,- capability), agronomy (rainfed crops and pastures and livestock carrying capacities, rangeland management and rehabilitation), botany and surveying. The consultancy team must also have a proven capacity to handle the mapping involved, be familiar with the use of satellite imagery, and have access to the back-up facilities needed for the task to be completed within 2 years of receiving the commission.

43. Experimental Design, Data Collection and Data Recording. In the first two years of the Project, the internationally recruited Project Agricultural Research Officer and Project Range Management Officer would be fully occupied implementing their respective aspects of the adaptive research and field trial program. It may, therefore, be necessary to use specialist consultants to assist them in preparing detailed experimental designs, methods of data collection, data recording formats, a step-by-step handbook of the analytical procedures to be employed, train Records Clerk Analysts in the data collection and tabulation procedures involved, select and train staff in the use of desk calculators capable of handling the statistical analyses involved and prepare a report which fully documents the whole process and includes table proformas in which the collated data and the results of the biometrical analyses carried out can be recorded. The consultants would report to the Project Director through the Project Technical Manager and would work in close cooperation with the Project Agricultural Research Officer and the Project Range Management Officer who would assume responsibility for implementing the program developed. Allowance is made for these consultants to return to the project area at times to be decided by the PMU. The demand for these return visits or the number required during the first phase of the Project cannot be precisely determined before hand but the allowance assumes each specialist would undertake three visits - the initial one, once for a mid-term review and once at the end of the Project to assist with a completion report designed to leave a comprehensive document detailing the work done, the procedures employed, the results obtained, the conclusions that can be drawn and the program of on-going adaptive research and field trials required to underpin a much expanded second phase Project. A total of 12 man-months of consulting time was allowed - that is two specialists, each for 3 man-months initially, 1 man-month for the mid-term review and 2 man-months for completion.

44. Relevant Attributes of Rural Communities within the Bay Region. Within the first 18 months of the Project, a Sociologist would be engaged by the PMU to study selected major rural communities within the Bay Region to assess their internal organization and external relationships with each other and in particular to establish the size, absolute and relative strength and structure of the social hierarchies that constitute each community's form of local authority, the mechanism whereby communal laws are formulated and/or modified and enforced; and to identify any cultural norms and practices of relevance to the implementation of the Project. The objective is to set up and test a check list questionnaire and report format which can be subsequentl

used by PMU personnel to generate the information necessary to identify which communities are best suited for inclusion in the first phase of the Project, which communities are too small relative to the numbers of farm families it is possible to serve from one water point and which of these are so located and organized to form a single operational entity for inclusion in the Project. The Sociologist would be required to work with and train a selected PMU officer to continue this work, the results of which must be made available to the Land Use, Vegetation and Land Capability consultants at the time they commence work. A total of 3 man-months is provided to fulfill this aspect of consultancy services.

45. Agricultural Engineer and On-Farm Grain Storage. The Project makes a 2 man-month allowance for the use of an Agricultural Engineer and/or on-farm Grain Storage Expert to resolve any specific problems encountered in the design and/or manufacture of the animal-drawn farm machinery or on-farm storage facilities. The decision to utilize this provision is to rest with the Project Director.

TERMS OF REFERENCE

Bay Region Agricultural Development
Data Collection Component

I. General Objectives:

There has been a concensus among consultants working in the Bay Region that the existing data base is very weak. This data base must be strengthened both to permit detailed planning and to measure project impacts. This study will collect essential data, socio-economic and technical, on existing practices in several sample areas of the Bay Region.

II. Detailed Scope:

A. Technical

The contractor will collect complete data on the current agricultural and livestock situation and practices. This data will include:

1. Inventories of crop lands and livestock;
2. Land use capabilities mapping including soils at a survey level;
3. Rainfall and climate data;
4. Crop and livestock yield data;
5. Complete inventory of existing crop and livestock practices and variance between practices;
6. Inventory of crop and livestock disease and insect problems;
7. Definition of land tenure patterns in the region;
8. Inventory of private and government services in the region;
9. Demographic sampling will be undertaken by the University of North Carolina on a sampling basis, the BRADP team will expand this sample as it moves into new villages.

B. Socio-Economic

The contractor will collect data concerning the socio-economic situation influencing crop and animal production in the area including:

1. Diversity of social organization;
2. Effects of social considerations on choice of farm enterprises;

3. Define the decision-making process;

4. Develop good partial budgets to indicate costs of production, profitability, etc. of representative farm systems;

5. Collect aggregate data on agricultural and livestock production, marketing, input supply, etc. for the Bay Region;

6. Undertake a household budget survey to determine present consumption patterns in the region;

III. Methodology:

It is suggested that due to the diversity found within the region, settled farmers, semi-settled farmers, nomadic groups, various ethnic groups, soils and climate variations, etc., the contractor should select samples which consider the diversity and draw a representative sample from various groups and areas.

The contractor will probably wish to have all members of the team involved in data collection both for the initial baseline data collection and for the ongoing evaluative data collection. In addition, the contractor may wish to incorporate some long and/or short term staff specifically for data collection and analysis.