

CLASSIFICATION  
**PROJECT EVALUATION SUMMARY (PES) – PART I**

Report Control  
Symbol U-447

<b>1. PROJECT TITLE</b>  Agricultural Technology Improvement Project	<b>2. PROJECT NUMBER</b> 633-0221	<b>3. MISSION/AID/W OFFICE</b> USAID/Botswana
<b>4. EVALUATION NUMBER</b> (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) <span style="float: right;">86-03</span>		<input checked="" type="checkbox"/> <b>REGULAR EVALUATION</b> <input type="checkbox"/> <b>SPECIAL EVALUATION</b>
<b>5. KEY PROJECT IMPLEMENTATION DATES</b> A. First PRO-AG or Equivalent FY <u>81</u> B. Final Obligation Expected FY <u>87</u> C. Final Input Delivery FY <u>89</u>	<b>6. ESTIMATED PROJECT FUNDING</b> A. Total \$ <u>12.3 million</u> B. U.S. \$ <u>9.2 million</u>	<b>7. PERIOD COVERED BY EVALUATION</b> From (month/yr.) <u>July, 1984</u> To (month/yr.) <u>June, 1986</u> Date of Evaluation Review <u>June 13, 1986</u>

**8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR**

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. ATIP needs to articulate FSR better to decision makers at the senior levels in the MOA.	ATIP	6/87
2. Alternative Strategies for insitutionalizing or gaining greater acceptance of FSR should be developed.	ATIP	12/86
3. The current placement of the RECU under the Crop Production Division of DAFS needs to be reassessed. The positioning and status of the RECU needs to be elevated - so that it can more realistically perform its research, extension and training coordination role.	MOA/AID	12/86
4. Every member of the ATIP team should be responsible for establishing good linkage relationships between research and extension.	ATIP	12/86
5. A qualified Mofswana should be assigned as counterpart to the ATIP COP.	MOA/AID	12/86
6. Suitable housing should be provided for all professional Batswana assigned to the ATIP field team.	MOA/AID	9/86
7. ATIP should establish better working relationships with on-station researchers.	ATIP/MOA	12/86
8. One or more qualified Batswana should be assigned to the RECU when the present RETO counterpart goes for long-term training.	MOA/AID	8/86

**9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS**

<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input checked="" type="checkbox"/> Other (Specify) <u>Reprogram project as per drafts</u>
<input type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	<input type="checkbox"/> Other (Specify)
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	<u>Reviewed by</u>
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P	<u>Team/GOB/AID</u>

**10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT**

A. <input type="checkbox"/> Continue Project Without Change
B. <input type="checkbox"/> Change Project Design and/or
<input type="checkbox"/> Change Implementation Plan
C. <input type="checkbox"/> Discontinue Project

**11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)**

E. Butler, Acting ADO, AID  
 R. McColough, AID  
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 C. Barnes, AID  
 Y. Merafe, MOA

**12. Mission/AID/W Office Director Approval**

Signature John E. Roberts  
 Typed Name John E. Roberts, A. Director  
 Date July 25, 1986

AID 1330-15 (3-78)

L. Mazhani, MOA

9.	Institutionalization of farming systems should be considered during the upcoming Agricultural Sector Assessment.	MOA	6/87
10.	Remaining GOB long-term training funds should be programmed primarily for professional training of extension staff.	MOA/ATIP	12/86
11.	USAID and MIAC should seek additional funds for long and short-term training for FS related positions.	MIAC/AID	9/86
12.	Training in the FS approach to research and extension should be included in the BAC curriculum.	MOA/ATIP	1/87
13.	In-service FS training should be provided for RSU/DPS and DAFS staff, especially DAOs and ADs.	ATIP/MOA	12/87
14.	Data gathering, management information systems and computer training should be provided for Botswana counterparts on the FS teams and also appropriate RSU staff.	ATIP	3/87
15.	The COP should spend more "quality" time interacting with the ATIP FS field teams.	COP/MIAC	6/87
16.	The project should employ additional administrative assistance and computer help for the COP.	MIAC/AID	9/86
17.	ATIP should develop an instructional guide on suitable FS methodologies for Botswana's unpredictable and difficult growing conditions.	ATIP	12/87
18.	The ATIP project should provide funds to enable its professional staff to attend and participate in regional and international seminars and workshops.	AID	11/86
19.	Channels should be established for ATIP to provide useful and timely information for DPS planning and policy decision making.	MOA/ATIP	6/87
20.	The ATIP should consider moving some of its field staff to Sebele to interact with station research and backstop FS field teams.	ATIP/MOA/AID	6/88
21.	Project funds should be provided to complete the AGRIFACTS update and facilitate the publication and distribution of AGRIFACTS and the Extension Handbook.	AID/ATIP	10/86
22.	The DPS should recognize the planning and policy assistance possibilities offered in the FS perspective aspects of the ATIP project, and participate more fully in FS team efforts.	MOA	3/87
23.	The funding for Bean/Cowpea CRSP participant trainees should be continued until completion of their degree program.	AID	12/86
24.	AID should determine what local currency expenditures are eligible for project funding, articulate this to ATIP, and establish suitable reimbursement procedures with the GOB	AID	9/86

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|-----|---|----------|-------|
| 25. | The GOB should establish a system for more timely submission of AID payment vouchers.   | MOA/AID  | 9/86  |
| 26. | The question of expanding FS work into commercial farming areas should be addressed in the upcoming Agricultural Sector Assessment.   | MOA/AID  | 6/87  |
| 27. | Project funded participant trainees in the U.S. should be kept fully informed about current ATIP activities and operations.   | MIAC     | 9/86  |
| 28. | To assist in the U.S. institutional development in the area of international agriculture, MIAC should consider campus appointments for the highly trained and field experienced ATIP staff upon completion of their Botswana assignments. | MIAC/AID | 12/87 |

AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT

(ATIP)

Contract No. 633-0221

External Evaluation

May - June, 1986

101

BOTSWANA AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT (ATIP)

EVALUATION REPORT

PES FACESHEET: RECOMMENDATIONS AND ACTION OFFICERS

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## EXECUTIVE SUMMARY

The external evaluation team in May - June 1986 found the ATIP program to be a well-managed scientific effort to collaborate in the development and testing of production technologies and strategies for low-resource Batswana farmers. A broad farming systems approach to identifying constraints to production and designing trials to test and demonstrate appropriate technology has been implemented by the project. Two teams of Batswana and MIAC technicians are conducting farming systems work in the regions of Mahalapye and Francistown, with principal activities in three villages in each region. Both teams have performed well, with field work complicated by the low and unreliable rainfall patterns since the inception of the project.

Training has been an important and successful component of the project. Fifteen Batswana have been financed for long-term study toward B.S. and M.S. degrees, and several of these specialists have returned to duties in the project and elsewhere in the MOA. ATIP has attracted additional interest from the GOB to provide an additional fifteen years of long-term training for qualified Batswana in research, extension, and planning. This part of the project will have a lasting impact on the competence of the programs of the GOB.

Several findings and recommendations were summarized by the evaluation team and discussed in debriefing sessions with the GOB, USAID/Gabarone, and the COP of the project. These are listed and described.

1. The CONCEPT OF FARMING SYSTEMS RESEARCH is a difficult one to articulate and to incorporate into an established research and extension system, since the impact may not be as easily measured as that of a new maize hybrid or an irrigation scheme. It is important that national decision makers as well as regional and district agricultural officers have a better understanding of how the farming systems approach can enhance the effectiveness of the research and extension system.

2. The EVOLUTION OF FARMING SYSTEMS METHODOLOGY and its adaptation to the harsh climate and soil situation faced by Batswana farmers is a continuing challenge to the ATIP team. With the completion of a large number of surveys with farmers and the data from several field trials in limited rainfall conditions, it will be possible to focus on selecting a series of key variables to measure and to streamline the FS process which could be used in new regions. This development of methodology will be a valuable contribution from the team, and should receive major attention during the rest of the LOP.

3. The LINKAGE OF RESEARCH WITH EXTENSION is an important element of success in many development programs. The RELO position in this project has this liaison as a principal responsibility, but the evaluation team feels that a greater emphasis by all ATIP staff should be placed on this critical activity.
4. The USAID DONOR SUPPORT TO ATIP for most project activities has been adequate, and many of the procedures have been improved since the last comprehensive review of the project. There is a continuing need for streamlining reimbursement of project and individual expenses, and to make available to the project the facilities and operating funds to keep the program efficient. USAID support needs to be expanded to include funds for participation in professional seminars and workshops by the ATIP staff, both Batswana and MIAC specialists. ATIP collaboration with the INTSORMIL TA staff and USAID support for the continuing field activities of this project adds another research capability to the total effort.
5. Most CONTRIBUTIONS OF THE GOB to the project have been at the levels agreed upon in the project agreement, indicating the government's interest and support of the program. There is a critical need to provide housing and other benefits which were supposed to be given to the Batswana staff in ATIP. If this problem is not solved by GOB, it will be difficult to retain these highly competent and well trained people in the project region.
6. The TRAINING OF BATSWANA SPECIALISTS has been an important component of the project from its inception. The AID funds allocated to the project have all been committed, and persons identified for long-term study. There is a continuing need in the development of the human technical resource in Botswana, and the funding assured by the GOB and potentially available from USAID and other sources should be pursued to train as many research, extension, and planning unit specialists as possible.
7. There are a number of POTENTIALS BENEFITS FROM ON-FARM RESEARCH which can be realized from the successful implementation of the farming systems approach. This can be especially valuable as research specialists from the DAR interact with ATIP staff in design and implementation of trials, and carry the results back to the station. This interaction and experience can influence the agenda of station-based scientists to work on priority problems of low-resource farmers in the region, and can give the research staff an opportunity to contribute to the priorities of the regional ATIP team.

8. The POTENTIAL INTEGRATION OF FARMING SYSTEMS ACTIVITIES into the on-going research and extension programs in Botswana has been advanced by the development of a document through the cooperative efforts of several current FSR projects. Although this institutionalization of FS work perhaps is not easily accomplished at this time, the successful work of the several projects will help to make this happen. The ATIP team is encouraged to collaborate with other projects to continue this quest for integration of activities with national, regional, and district offices of the MOA.

9. The potential for FARMING SYSTEMS WORK TO AFFECT POLICY at the national level needs to be explored further in Botswana. When key information is collected from farmers in a region about the effects of national policy on their potential production and income, it is possible to identify possible modifications in policy which will enhance farmers' success. There is a need for the ATIP staff, and especially the COP, to work with colleagues in the MOA to identify these key issues and to provide information to DPS decision makers when there are specific interventions which the government should consider to help the limited resource farmer.

AID/Botswana has extended the project two years past the original PACD of September 1987 to September 1989. The evaluation team concurs with this "extension." The present MIAC contract terminates in December 1987, and the evaluators are hopeful that AID regulations will allow MIAC to participate in the remaining three cropping seasons of the ATIP. A longer time frame will allow for sufficient in-depth treatment of the above challenges. It is critical that AID begin the contracting process at least one year ahead of the December 1987 date to assure project continuity.

Depending on project maturity and changing national priorities, a refinement of the project might be called for in mid 1987. Adjustments could be made in team composition, locations, and responsibilities at that time. If formal working agreements can be put in place during the present LOP for active extension participation in FSR, and if the farming systems approach is made an integral part of research and extension programs, then the evaluation team recommends that an ATIP Phase II follow-on program be considered by USAID/Botswana.

## I. BACKGROUND TO PROJECT EVALUATION

### A. Project Objectives, Modifications and Refinements

The Botswana Agricultural Technology Improvement Project (ATIP) is part of A.I.D.'s program to improve the welfare of small farmers and increase food production through the development, extension and adaptation of relevant farming technologies. This goal also reflects GOB and USAID/Botswana efforts to increase productive employment opportunities in rural areas. While Botswana has experienced rapid economic growth in recent years through the expansion of mining industries and increased livestock production by the commercial farming sector, this growth has provided limited employment opportunities and few direct benefits to the 85% of Botswana who live in rural areas. Initially, the GOB tried to address this problem by rapidly expanding social services in rural areas. Recently, however, the GOB shifted its attention to improving arable agricultural production by small farmers through its Arable Land Development Program.

The original purpose of the ATIP project was to improve the capacity of the GOB Ministry of Agriculture (MOA) to develop and extend Farming Systems (FS) recommendations relevant to small farmers and provide adequate supplies of quality seed. Specifically, as first designed, the project sought to (a) institute a system of on-farm research and experimentation to identify constraints and develop solutions for small farmer production problems; (b) strengthen the capability of the MOA's Department of Agricultural Research (DAR) and its research stations to undertake research on small farmer crops (cereals and legumes); (c) institutionalize linkages between the Department of Agricultural Research and the Department of Agriculture Field Services (DAFS) (i.e. extension service) to insure that the technologies developed for small farmers are disseminated to the target group, and (d) expand the capacity of the MOA's Seed Multiplication Unit to provide quality seeds for major food crops. While the project is essentially institution-building in nature and will have only a few immediate beneficiaries, the target group of small farmers - those having between one and ten hectares of land and less than 40 head of cattle - comprises nearly 60 percent of the traditional farmers in Botswana, or some 47,300 rural households. Approximately 40 percent of these farm families are headed by women, and almost all of these low resource farmers should indirectly benefit from this project in the intermediate to long-term.

The Agricultural Technology Improvement Project was authorized on September 24, 1981 for \$9.18 million (LOP) and the Grant Project Agreement was signed on September 29, 1981. A technical assistance contract with the Mid-America International Agricultural Consortium (MIAC), with Kansas State University as the lead institution, was signed on July 1, 1982. The project provides technical assistance and training

for farming systems research (FSR). It funds three expatriate Agricultural Economists, two Agronomists, an Extension Specialist and an Animal Scientist. In addition to MIAC project staff, a cowpea specialist and two sorghum/millet scientist are being provided under two centrally-funded Collaborative Research Support Programs (CRSP).

By 1985 the two FSR teams in Mahalapye and Francistown had expanded their surveys and trials to six villages. During 1985, (the fourth drought year in succession in Botswana), less FS emphasis was placed on descriptive work and more on design and testing. Few interventions had been sufficiently tested and proven at that time to move forward to the dissemination stage. With the arrival of additional micro-computers in 1985, data entry and data analysis became more timely. Two Botswana counterparts returned from the U.S. with M.S. Degrees; one to work directly with the project and the other in the MOA in a position associated with Farming Systems Research (FSR) development. Four counterparts remained in training at the end of 1985.

In late 1985 USAID/Botswana amended the Project Agreement (PIL 15) to extend the PACD from July 1987 to September of 1989. Eighteen person years of long term training were added to the original project and the MIAC contract was extended, at no cost, through December of 1987. These modifications were the result of evaluation recommendations and adjustments to a period of extremely poor climatic conditions throughout Botswana.

At the time of this evaluation USAID/Botswana is engaged in further refinement of the ATIP and is going forward with an additional one year PACD extension (to September 1990). No additional AID funds or positions are being asked for in this extension either.

This extension is to give the project an additional year in which to test the Farming Systems Research (FSR) approach. Botswana has experienced drought since the project's inception in September 1981. Like many other semi-arid countries, Botswana experiences widely fluctuating climatic cycles; historically, the duration of Botswana's rainfall cycles has been approximately 18 years, with alternating nine-year periods of wet and dry spells. During such a cycle, two to three consecutive years of severe drought sometimes would be expected; but the five consecutive years of severe drought that Botswana has just experienced is most unusual. These conditions have not given ATIP an opportunity to fully test the effectiveness of an FSR approach or develop technologies appropriate to varying rainfall conditions. Adding the 1989/90 growing season, as proposed, and extending contract-funded technical assistance until the end of the project will hopefully provide sufficient time and level of effort to draw some major conclusions about the appropriateness of FSR in Botswana. The extension of the PACD should also

give the GOB's Ministry of Agriculture (MOA) enough time to solidify their views on the appropriateness of institutionalizing the FSR approach on a national scale.

Following the 1984 mid term project evaluation the Logical Framework was revised when it became apparent that the original Logframe was overly optimistic and unrealistic. While the Agricultural Technology Improvement Project (ATIP) is already identifying technical changes which will work under specific conditions, it is not likely that these will increase grain production by 10% or increase per capita income by 10% (as stated in the original Logframe). Changes of this magnitude can only come about through favorable weather conditions and a longer-term farming systems research effort. One of the important criteria for AID to determine the effectiveness of the project is institutional acceptance of the FSR approach by the MOA and adoption of changes by the research and extension branches to work effectively together to meet farmers' needs. The institutional acceptance of FSR by the MOA will be based on the results of FS work in ATIP and other donor FSR project areas. The proposed revised project is therefore recast somewhat from the original project paper. Full institutionalization of FSR is no longer expected to take place before the end of the present MIAC contract. Rather, the mission feels that the project will have provided sufficient experience and empirical evidence by the PACD to demonstrate whether or not the FSR approach should be institutionalized. USAID, however, does expect the MOA to make a decision regarding the institutionalization of FSR by 1989 and to make appropriate policy and organizational changes to accomplish this if FSW in Botswana shows success. These changes are reflected in the revised Logical Framework and some relatively minor changes in the project workplan.

#### I.B. ATIP Revised Activities

The purpose of the project is to improve the capacity of the Ministry of Agriculture's (MOA) research and extension programs to develop and effectively extend farming systems recommendations relevant to the needs of small farmers in selected pilot areas. The project has three sub-purposes which contribute to the institutionalization of a Farming Systems Research (FSR) program in Botswana. These are:

A. To improve the capacity of the Ministry of Agriculture's Department for Agricultural Research (DAR) to develop technologies for small farmer needs.

B. To improve the capacity of the extension service to transfer appropriate technologies and strengthen the linkages between research, extension and farmers.

C. To provide Botswana farmers in the pilot areas with relevant innovations in agricultural production technology and methods through field trials, demonstrations and farmer training.

Over the project life, FSR teams will be working with farmers on their fields testing various production increasing technological practices. These teams will serve as the focal points for initiating adaptive Farming Systems Research activities. Technical assistance provided at the national level will complement work undertaken by the regional teams by improving the capacity of the Department of Agricultural Research to focus on problems relating to small farmer needs and by improving the linkage between the Department of Agricultural Field Services (DAFS) and the Department of Agricultural Research (DAR).

Professional work of ATIP has emphasized two major areas:

- (a) Work undertaken by two Farming Systems teams located in Mahalapye and Francistown.
- (b) The work of the Research Extension Liaison Officer (RELO) and the Chief of Party whose major functions are to improve communication and cooperation among FSR projects and between the Departments of Agricultural Research (DAR) and Agricultural Field Services (DAFS).

The four years of ATIP's activities in Botswana have coincided with a prolonged drought which is in fact still continuing. Investigations of weather patterns by scientists have indicated that there is evidence of a 10-year climatic cycle in Southern Africa with the decade of the 1980's predicted to be dry. There is no question that this prolonged drought cycle has caused problems in terms of ATIP's progress. However it can also be argued that the experience has enabled ATIP to focus on developing technology options that give at least some returns in periods of drought stress, which occur on a regular basis in Botswana. It also forces a first hand awareness of the realities of working in a highly various and unpredictable drought-prone agricultural environment.

AID inputs under the proposed extended PACD will consist of about 52 person years of long-term expatriate technical advisors and about 37 person months of short-term consultants. Short-term consultants will supplement long-term technical services but may also be used for external evaluations, special assessments or audits if necessary. Long-term technical assistance under the planned amendment includes approximately two years for a seed technologist to support the MOA's Seed Multiplication Unit. AID will also finance, subject to the availability of central or regional funds not included in the project, technical assistance for basic crop research at the Central Agricultural Research Station at Sebele. By the end of the project it is planned that fifteen AID funded participants will receive long-term training in the U.S. (estimated 44 py) in BS and MS agricultural related programs. Returning participants will serve either as counterparts to ATIP team members, on other farming systems projects, or in key MOA positions associated with farming systems work. Approximately 40 person months of

short-term U.S. and Third Country training will also be financed by AID. In-country training courses can be held on project related topics and financed by short-term training funds. AID will also provide limited logistical and support services and some commodity purchases during the LOP.

During the newly proposed LOP the GOB will continue to provide salaries for Botswana counterparts who will both work with the U.S. team technicians and be trained under the project. Additionally, the GOB will provide project support staff such as extension workers enumerators, secretarial staff and casual laborers. The Ministry will continue to provide vehicles for the use of the U.S. long-term technical assistance staff, in-country per diem for counterpart and technician travel, and agricultural equipment and other field supplies required to support field work. The GOB will also continue to provide office supplies, stores and funds for research support for the U.S. long-term technical assistance team, and all housing and office facilities for all long-term technicians, and host country counterparts. Rondavels have been built in villages where the teams work. Customary GOB furnishings have been provided by the GOB for all the houses and office blocks.

The GOB will also fund 15 person years of U.S. and Third Country training for counterparts as well as international travel costs for AID and GOB funded participants.

AID Botswana estimates project outputs at the termination of ATIP is a minimum of two Botswana Farming Systems Teams, fully staffed and using approved and tested methodology, which will result in increased production. Alternative crop and livestock technologies will have been farm tested and ready for dissemination in at least six areas.

Through long-term training approximately 20 qualified staff will be placed in key FS and related positions. Institutionalization of FSR, with corresponding organizational structures and systems will be in place and operating effectively.

The seed technology unit will have been strengthened and trained personnel in charge. Basic crop research programs on sorghum, millet and cowpeas will be functional and staffed by nationals, with progress being shown on varietal and cultural practices. Other outputs will include a functioning research and extension data base system manned by trained MOA personnel capable of maintaining, improving, and creating critical production information and data.

#### End of Project Status

By the end of the project it is anticipated that an ongoing FSR approach will be established and tested in selected areas of Botswana. Within the context of this approach, the following will have taken place by the end of the project:

- (a) The Ministry of Agriculture's Department of Agriculture Research (DAR) will be structured to respond more effectively to FSR and to farmers' needs. Specifically, 1) on-station research at the DAR will be structured to use a commodity approach, emphasizing cereals and legumes, and, 2) systems will be established to respond to requests and suggestions from extension and FS teams, and conduct trials based upon these requests.
- (b) Improved linkages will have been established between the Ministry of Agriculture's (MOA) Research and Extension Departments resulting in the development and dissemination of more relevant production technologies. The Research and Extension Coordination Unit will be staffed with qualified Batswana and functioning effectively; the Department of Agricultural Field Services (DAFS) will be disseminating tested technologies in pilot areas; and improved communication will be taking place between DAFS and farmers in pilot areas.
- (c) Technologies will be identified and tested in the pilot areas which increase small farm production and yields and/or improve returns to labor/capital.

#### I.C. Project Setting

##### 1. Project setting

The Republic of Botswana, which has a little over one million inhabitants attained independence on the 30th September, 1966. The mean altitude of this landlocked country in southern Africa is 1 000 metres above sea level. It covers an area of approximately 582 000 km<sup>2</sup> and is slightly larger than France or slightly smaller than Texas.

There are two basic patterns of rainfall in Botswana. First, there is a progressive reduction of precipitation from north-east to south-west. Second, in the eastern border areas and the Limpopo Valley, rainfall is sufficient to encourage arable cropping. Vegetation mirrors rainfall and soil patterns. The grasslands are located in the north-western areas, while in the east the terrain is primarily scrubland. Above the frost belt there are small areas of tropical forests and a few fruit orchards.

The average rainfall is less than 475mm per annum. In the desert conditions of the extreme south-west, this figure is approximately 250mm, whereas in the north-east it exceeds 650mm. More than 90 percent of the rain falls in the summer months between November and April, but there is significant variation from one year to another and rainfall is extremely unpredictable. Botswana is prone to periods of severe drought often extending over a number of years.

The government has enunciated the following aims for agricultural development in Botswana:

- a. to assist those involved in agriculture to enjoy adequate and secure livelihoods;
- b. to create more such livelihoods to meet the demands of a growing labor force within Botswana;
- c. to raise national incomes by increasing the value of agricultural production; and
- d. to maintain agricultural land for future generations.

These aims are set out in the National Development Plan of 1979-1985 and 1986-1991 and have been selected based on the fact that agriculture is the backbone of the rural economy. Farming directly involves four-fifths of the rural households, among them most of Botswana's poorest families.

The severe drought which has ravaged the country for the last four years has compelled the government to divert limited financial and manpower resources from most of these stated aims and to concentrate its efforts on drought relief programs. A sum of P36.2 million was earmarked for such programs during the financial year 1985/86. A large part of these funds were allocated to labor-based relief projects which are designed to inject income into rural areas where most of the population lives.

Most parts of the country are facing a fifth consecutive year of drought. The Ministry of Finance and Development Planning has announced that detailed nationwide assessment is being undertaken. Some P49.3 million has already been included in drought expenditure and, depending on the severity of the drought, an additional allocation may be required.

During 1984, 85 and 86 extensive support was received from donor countries and international agencies; approximately 55,000 tonnes of food were donated to Botswana for supplemental feeding of drought victims.

The intermittent long drought spells which have occurred over the last decade have demonstrated the need for permanent institutional machinery to ensure a long term response capacity to the effects of drought. A National Food Strategy was initiated in 1984 to coordinate the food-related programs of various ministries, government agencies and the private sector. Its purpose is to increase food production from both dry land and irrigated farming improve seed production and distribution, and build the strategic grain fund to an adequate level. Clearly ATIP contributes to these efforts.

2. Small Farmer

Development programs

In pursuance of its aims the government has introduced a number of development programs such as the Tribal Grazing Land Policy and the Arable Lands Development Programme.

The Tribal Grazing Land Policy (TGLP) introduced a new land-use and allocation system in the tribal grazing lands.

- a. Communal areas are to be reserved for small cattle owners who are encouraged to form group ranches and manage their herds communally. These group ranches are given priority in the allocation of communal land when it becomes available.
- b. In the commercial farming areas individuals and groups take out 50 year commercial leases.
- c. Reserve areas will be zoned for future use.

Although the policy was introduced in 1975, the concepts of leases and exclusive rights to land are not always well understood. Some difficulties have occurred in the implementation of this policy and the achievement of its objectives.

The Arable Lands Development Programme (ALDEP) focuses on:

- a. increasing production to achieve sustained self-sufficiency in basic grains and legumes at the rural and national level;
- b. raising incomes of arable farmers through improved agricultural productivity and ensuring more equitable income distribution;
- c. creating employment in rural areas to contain urban drift.

The program is designed to assist small farmers. The target group is the estimated 70,000 arable land households which plow less than ten hectares and own 40 or less cattle. These farmers constitute approximately 70 percent of all crop farmers in the country. Many lack the resources to purchase implements, improved seeds or fertilizer. Approximately half of all arable farm households have no direct access to draft power and less than ten percent have cultivators or planters. ALDEP Phase 1 covers some 11,000 subsistence farm families, approximately 17 percent of all crop farmers.

Of these 11,000 households  
3,000 have no direct access to draft power;  
4,000 have adequate access to such power;  
1,000 may fall into either category, but practice farming  
in the Okavango Delta, which is subject to seasonal  
flooding.

Farmers may also face fencing and on-farm water supply constraints. The project assists these farmers with investments in draft power, farm implements, fencing and water tanks. An additional component would cover seasonal inputs such as seeds, fertilizers and pesticides. The primary target areas are in the communal lands of eastern Botswana and Ngamiland. ALDEP operates in both ATIP field areas.

### Accelerated Rainfed Arable Programme (ARAP)

#### Background

In its efforts to promote food production and rural development, the government has during the past several years, introduced a number of programs which included ALDEP, FAP, AE10, SLOCA and others. The aim of these programs were to provide inputs and resources to farmers to enable them to increase food production and create employment generation.

In the normal process of reviewing programs, it became apparent that there was a large group of medium level farmers, engaged in rainfed arable production who were not covered by either FAP or ALDEP. It was therefore necessary to design a package that would be directed to this group of farmers. This has given rise to the introduction of the ACCELERATED RAINFED PROGRAMME (ARAP) which was recently approved by Cabinet.

ARAP is a one time assistance program which is aimed at all farmers engaged in rainfed arable agriculture who do not qualify for FAP assistance. The program will become operational this season and will include the following packages.

- (a) Assistance for destumping of new lands or expansion of existing lands
- (b) Assistance for draft power hire
- (c) Assistance for inputs procurement
- (d) Assistance for fencing of fields
- (e) Water development for crop farming communities
- (f) Crop Protection Program

It should be noted that due to the time constraint and inadequate implementation capacity, it will not be possible to cover the majority of eligible farmers in the first year. In such a case, those farmers who do not benefit this year, the same packages will be made available to them next year.

As in all other assistance programs, farmers who wish to participate in the ARAP will have to register with the agricultural demonstrator where their lands are located.

Description of Packages

(a) Destumping

This package will provide financial assistance to rainfed arable farmers to destump either virgin land which has not been under production but is part of an existing field or new land that has not been under use. Each qualifying farming household will be assisted to destump up to a maximum of 10 hectares at P50.00 per hectare. The package became operational at the beginning of 1986.

(b) Draft Power Hire

The package will consist of three elements. These include plowing, row planting and weeding. Each farming household will be assisted up to a maximum of 10 hectares. The package will provide P50.00 per hectare for plowing and P10.00 per hectare for row planting. In addition the package will assist in the weeding of the crop. This will be paid at the rate of P5.00 per hectare.

(c) Input Procurement

The package will assist farmers to obtain improved seed and fertilizer. Only open pollinated sorghum seed or millet in some cases will be provided under the package. With regard to seed, each farming household will be provided with enough seed to plant up to ten hectares. This amounts to 8 kg per hectare for ten hectares or 80 kg of seed. Implementation of this package might not cover all eligible farmers this season. In view of this, the majority of farmers will participate in this package in 1986.

In addition, each farming household will be provided with fertilizer to cover up to 3 hectares. This will amount to 200kg/hectare of fertilizer for 3 hectares.

(d) Fencing of Fields

The package is aimed at assisting farmers to fence their fields to protect crops from damage to livestock. The package will assist farmers with a grant to fence up to 6 hectares of land.

(e) Water Development

This scheme will assist in the provision of water for humans, and draft power at the lands areas. The package will assist by providing funds to meet the costs of equipping boreholes and for reticulating water in the lands areas.

It is expected that farmers associations and groups will be responsible for raising funds, for example from the National Development Bank or other sources for drilling boreholes where necessary and secondly for ensuring maintenance and running costs through collection of fees from the community.

(f) Crop Protection

This package is intended to assist farmers with coping with outbreaks of crop pests. Funds will be provided to the Department of Agricultural Field Services to enable it to provide timely assistance during outbreaks of pests such as quelea, locusts and worms of any sort.

3. Land Tenure

There are three legally recognised categories of land tenure in Botswana: state land (23 percent), tribal land (71 percent) and freehold land (6 percent).

State land falls under the direct control of the central government and any applications for leases must be referred to the Ministry of Local Government and Lands.

Tribal land is allocated by Tribal Land Boards under Tribal Land Act, 1968. This act aims at developing a process of land allocation in accordance with Botswana's democratic principles, providing a legal framework for land allocation in tribal areas and encouraging agrarian land reform.

Freehold land. While there is no formal policy to buy back land owned by non-citizens, the government intends to encourage Botswana ownership. The Land Control Act, 1975, states that all land for sale must be advertised in Botswana and that ministerial authority must be obtained for all agricultural land transactions involving non-citizens. This authority will only be given if there is no citizen who wants and is able to acquire the land. Furthermore, a higher rate of transfer duty, (presently 30 percent), is levied on transactions involving non-citizens. The transfer duty for citizens is only five percent.

Freehold land is concentrated in the Francistown, Gaborone, Ghanzi, Lobatse, Molopo, and North East Districts and the Tuli Block areas. Large ranches are located there and modern skilled agricultural practices are employed. Increasing numbers of Botswana farmers are purchasing land in these areas.

4. Marketing

The marketing of agricultural products is handled by the Botswana Agricultural Marketing Board, a parastatal body established in June, 1974. The main functions of the board are to buy all scheduled produce offered to it for sale by producers at not less than a guaranteed minimum price and to ensure adequate supplies of such produce for sale to consumers at reasonable prices. Scheduled products are sorghum, millet, rice, maize, wheat (meals or flour), pulses, sunflower seeds, groundnuts, castor beans, cotton seeds, soybeans and their seeds.

At present the board handles almost all the agricultural products of Botswana - maize, sorghum, sunflower seeds, groundnuts, peas and beans. The board has depots throughout the country and where no depots exist co-operative societies act as agents. The board announces guaranteed minimum producer prices before planting commences. It tries to assure that sufficient stocks are stored in country to meet consumer demands.

Any surplus is exported. Should there be a shortfall in any of the scheduled products the board will address this through imports. It is estimated that 90% of all food stuffs are presently being imported. It should also be stressed that the board does not have a monopoly over the domestic market. The board also handles the sale of farm inputs such as jute bags and fertilizer, but has no facilities to offer credit.

During the period 1982/83 deliveries of domestic crops to the board amounted to 7,239 tons - a decrease of 65 percent from the previous year. Total purchases and production of different crops during the 1985/86 crop year are expected as:

#### 5. Research Policy

The present five year National Development Plan's objectives remain largely the same as the 1979/85 plan. Arable research continues to include a farming systems approach and places more emphasis on activities geared toward drought avoidance strategies e.g. identification of early maturing cultivars, appropriate tillage, and effective weed control. Animal research activities continue to address the problems of production in the communal areas as well as the ranching sector. It also pays particular attention to the problems associated with range degradation.

A further major policy issue being addressed by the Ministry is to reduce migration from remote rural areas into large villages and towns. This can only be achieved through development of the agricultural sector. Thus, the Government's stated objectives are to seek an immediate and dramatic development of agriculture as a major part of total development.

Traditionally, research has been geared toward an increasing yields per unit area or per animal. There is the implicit assumption that farmer motivation is cash oriented and that the farmer has reasonable access and control over available resources. While this may hold good for farmers in many countries, the highly unpredictable Botswana rainfall pattern coupled with the communal situation, presents a far more complex production system. The technology required to achieve an increase in total production can be very different from that required to increase yields per unit of land or

per animal. The need to address this difficulty has been emphasised by the ATIP farming systems teams.

6. Future Plans and Project Implications

The Government of Botswana has decided to undertake an Agricultural Sector Assessment starting sometime this year. As a result of that exercise a research strategy will probably be developed that may provide for the development of a National Farming Systems Research and Extension Program. At present the Ministry has developed an interim Agricultural Research Strategy statement and has under review a plan for institutionalizing FSR. Both are only under consideration at this time and it is unlikely that they will be acted upon until after the upcoming Agricultural Sector assessment. Details are provided in Annex F.

I.D. Summary and Conclusions of Previous Evaluations

There have been two external evaluations of the project. The first, in July of 1984, was conducted by a multi-disciplinary team of research, administration and extension specialists. A second review was completed in December of 1985 by the Regional Inspector General's (RIG) Office of AID, Nairobi. These two documents, together with volumes of GOB and ATIP publications, were used as background for this present report.

The conclusions of the 1984 evaluation were quite positive. The review team felt that under rather extreme conditions MIAC had done an exceptional job. The RIG report pointed out time lags in planned outputs but was positive in term of expected LOP progress. Summaries of these evaluations and an up-date of ATIP actions on their recommendations are attached as Annex B.

A major amendment to the project agreement and an extension of the PACD is planned for mid 1986.

I.E. Scopes of Work for Present Evaluation

As an assistance in project implementation and to prepare documentation for a no cost extension of ATIP, the mission requested assistance from REDSO/ESA, AID's regional office in Nairobi, to complete a project evaluation. For this project review the Ministry of Agriculture provided a Plant Breeder from the Arable Research division and a sociologist from the division of planning statistics. From REDSO/ESA, a Regional Agricultural Development Officer and a Sociologist along with a Livestock expert from AFR/TR/ARD and an Agronomist from the University of Nebraska together with a MOA personnel completed this second evaluation. Comments were also provided to the Mission on project extension documentation under discussion

with the GOB. The presentation of this review follows the scope of work, presents lessons learned during the first half of the project plus our conclusions and recommendations for certain implementation tasks during the remainder of the ATIP project.

The Scope of Work provided by USAID/Botswana is attached as Annex A. Special issues raised by ATIP on behalf of their technical management also considered in our recommendations are to be found in Annex G.

## II. PROJECT ACTIVITIES AND COMPONENTS

### A. Comparisons of Project Achievements with Logical Framework Matrix, ATIP Field Teams

There is some difficulty in evaluating project achievement by comparison with the logical framework given to the evaluation team, since this log frame is currently under revision in an amendment to the project. The following evaluation is based on the log frame with the latest amendment. Where this new log frame has been modified from the one in the original project document, this fact is pointed out. Comments on verifiable indicators are listed by page and topic in the latest log frame as it will appear in the amendment.

#### Measure of Goal Achievement

A-1. Although agricultural research and extension continue to be high priorities for the GOB, there is little indication that the FSR system has been understood and adopted, nor that this will occur in the near future. A proposal has been submitted to the MOA to take a series of steps to institutionalize the FS process within the existing ministry structure, and this would include all the FS projects in the country. This has been with the MOA for about six months, and no response has been received. There have been no indication of consistent and demonstrated increases in production nor income as a result of introduced technologies, except under favorable soil and rainfall conditions. In the first four years of the project, rainfall has been limited and erratic. The revised log frame for the amendment reflects the need to look at other measures of success.

#### Objectives and Project Purpose

B-1a. The capacity of the MOA to develop and extend recommendations to farmers in pilot areas and in the rest of the country has been enhanced by the training of Batswana to take positions of importance in the DAR, DAFS, and DPS, as well as with the ATIP field teams. There is a growing appreciation of the farming systems perspective, although the evaluation team finds little indication that this approach is likely to be widely adopted by the MOA in the near future.

An improved working relationship between research station based scientists and the ATIP teams in the field is being developed. The evaluation report section on station research (IIC) gives more detail on progress in this area. The field teams of ATIP are providing some feedback from extension agents in the districts to the research team at Sebele, but there is still need for fostering more communication within the research community. The field teams have conducted some component trials in collaboration with the station scientists -- more of this will take place during the remaining LOP.

B-1b. There have been a number of initiatives by the ATIP team, and especially the RELO, to establish linkages at the national level. The RELO is a member of a number of national level committees which are seeking better integration of these departments of the MOA. The review team concludes that more can be done at the regional and district level to accelerate these linkages. The DAFS is disseminating recommended technologies within the pilot areas, including improved seed, support for plowing and destumping, and fencing to control animals. There is a need for more ATIP collaboration in this process, and the field teams in pilot areas could collaborate more with the DAFS to study the process of adoption and the effects on production.

B-1c. A number of recommended technologies have been tested in the project pilot areas. Some of these provide consistent increases in production and income, such as the improved varieties of sorghum. Many of the recommendations appear to be less consistent in performance, and there is a need for continued testing in collaboration with station scientists. These comments relate to most of the items in the log frame in the project paper. One item not specified in the new version was that 2000 tons of seed would be produced per annum, and the seed production unit has already reached twice that amount -- about 4000 tons in 1985.

#### Project Outputs

C-1a. There are two ATIP teams in the field which have functioned with counterparts for each TA position in Mahalapye (4 years) and Francistown (3 years).

C-1b. Recommended practices for sorghum and millet production have been tested in "maximum yield" plots, as well as in other researcher managed and implemented and farmer managed trials. Livestock technologies have been limited to feeding of mineral supplements, and a new thrust on fodder production and feeding to improve the quality of draft power for plowing.

C-2a. Staff development has proceeded on schedule, with the last candidate under the current project scheduled to leave for training in August 1986. The majority of these Batswana have not yet returned from training to assume positions in the project.

C-2b. The position of FSR within the structure of the MOA has not yet been determined, although a proposal has been submitted for the institutionalization of the project and concept.

C-2c. The enthusiasm by the MOA for long-term training of Batswana specialists outside the country for B.S. and M.S. degrees is an indication of interest in the project or at least in the advanced training for local staff. There is no indication to date of lasting interest in FSR.

C-3a. The seed technology unit has functioned well, and Batswana are in long-term training for localizing all positions in the program. The success of producing 4000 tons of seed in 1985 has been noted elsewhere.

C-3b. There is a training plan which has enabled the project to commit all training funds for long-term study by Batswana. A more comprehensive plan is needed which includes DAR, DAFS, and DPS personnel who will be financed by USAID, GOB, and other donor countries; this would allow the training plans of the MOA to move ahead smoothly, with replacement persons for those who will be out of the country. Specifically in the seed production area, there is a need for training technical skilled people to run machinery in the plant and instruments in the laboratory. Some of this training can be done inservice in the country.

C-3c. Basic research is delegated to the Sebele station and to researchers who are assigned there. This total effort is supplemented by TA staff from INTSORMIL and the Bean/Cowpea CRSP, as well as other long-term technicians brought in by other donor organizations. There is a need for more coordination of the total research effort, so that ATIP specialists can contribute to the process without duplicating what is done on station.

C-4a. Data from surveys and field research data on the project has been catalogued well, and a uniform system of coding and retrieval instituted over all project sites for use by all technicians. This will provide the maximum possible benefit now and in the future as data are merged from several surveys, and new questions arise which can be answered from the existing data set.

C-4b. Much of the data has been summarized, analyzed, and written up for use by the project and by MOA. There is still a large number of surveys which are in process, and which need to be summarized so that the data will be more useful.

C-4c. A system of coding has been established which is uniform across the project, and which can be used to facilitate retrieval of information in the future. The project has made excellent use of microcomputers to facilitate this task.

#### Project Inputs

D-1a. Long-term technical assistance by the MIAC team has been provided by the contractor on schedule, and each of these technicians has had prior development experience -- mostly in Africa. USAID has made available the funds for training long-term participants in the project, and the last of these people will depart for study in August 1986. Purchase of seed, equipment, and other agricultural inputs under the contract has been accomplished as needed, although the current contractual arrangement of doing all these purchases through USAID rather than directly from project funds is at times cumbersome and time consuming. Although there have been consultancies and short-term training in the project, these funds have not all been used and these activities would appear to have greater potential than has been realized to date. Long-term training

plans have been implemented on schedule, and the last Motswana to leave for study will depart in August 1986. Three participants have returned from study and assumed positions in the project, although one has recently moved to another position outside the MOA. The GOB agreement for training outside the country for these young professionals indicates an interest and agreement with this approach to upgrading competence in the ministry, if not an acceptance of the FSR methods.

D-lb. GOB has provided most of the person years of counterpart time called for in the contract, although these individuals have not always been at a level of training to take best advantage of their association with TA personnel. Since the start of the project, there has been no designated counterpart for the Chief of Party of the ATIP. The GOB contribution for long-term training is scheduled for 1987, and the vehicles called for in the log frame have been provided.

## II. Project Activities and Components.

### B. Agricultural Technology Improvement Teams.

#### 1. Collaboration with Research:

The collaboration objectives of the ATIP include working with research specialists (a) to test available recommended technology; (b) to determine which of the recommended approaches under what conditions will help farmers to achieve higher production, increased income, and greater production and income stability; (c) to relay information about these trials back to researchers as a part of the process in setting priorities for further research; and (d) to seek other ways to draw research specialists into an expanded activity in on-farm testing of potential new technology as a part of an overall FSW approach in Botswana. A number of initiatives have been taken by ATIP to realize these objectives.

a. One of the first activities of each regional team was to seek advice from Sebele on recommended technology for the marginal rainfall areas designated for project activity. These included improved varieties of sorghum, millet, and cowpeas and a number of cultural practices to conserve moisture and promote good germination and crop growth -- plowing with first rains, row planting with equipment designed at Sebele, and plant densities appropriate to limited moisture conditions. These practices were tested in "maximum yield" plots during the first two years of the project. More recently there have been tests of double plowing, deep ripping, and land shaping for water harvesting.

b. Several of these practices have proven to be profitable under some conditions, but there is no consistency to performance nor general application of technology aside from the Segalane sorghum variety released by Sebele. The on-farm testing of technology has drawn some interest from Sebele, although there could be greater collaboration and more visits by ATIP staff to Sebele and certainly a conscious effort to attract station scientists to participate more directly in a collaborative on-farm testing effort.

c. The results of these trials have been summarized and presented to researchers at Sebele. The research group is aware of the difficulties of the farm environment, and realizes that it is difficult to make recommendations which will widely apply under such resource-limited conditions. Yet there could be a greater communication of the ATIP staff with the station-based researchers in describing the specific nature of current cropping systems and constraints, and a more in-depth participation in the process of setting research priorities. The COP and RELO could play a stronger role in helping this to happen, although individual specialists on the ATIP team should also put higher priority on working directly with their colleagues involved in station research.

d. There is potential for greater collaboration between specific ATIP team members and researchers at Sebele. If there were more visits back and forth, and a closer professional relationship between individuals in each discipline, a closer collegial relationship could be established which would lead to greater progress in FS work in the field. Most of these types of interaction depend on good working relationships, and it is possible to establish these types of mutually beneficial activities under almost any type of administrative arrangement. There is little a project can do to dictate or legislate collaboration or teamwork. The collaborative activities need to be of benefit to each individual and organization, and collaboration can be encouraged by administrators and by organizations -- yet the actual field implementation depends on a sincere interest by individuals to make it work. This area of collaboration with station research needs continuing attention by ATIP.

## 2. Collaboration with Extension

One of the objectives of ATIP is to work with extension in specific regions to move appropriate technology to farmers. This objective is (a) promoted by the organization and presence of extension agents (ADs, CPOs, APOs) in all districts in the country, (b) hampered by the low level of preparation of these extension agents and their many duties in administering national programs, (c) made more difficult by the lack of specific component technologies or packages of practices which are widely and consistently profitable for farmers, and (d) one which could be approached through an effective implementation of the FS strategy at both the local and the national level. Each of these factors has influenced the lack of success of the ATIP to effectively interact with extension, and much needs to be done in this area.

a. The organization and geographic dispersal of ADs throughout the agricultural regions and districts of Botswana could provide a framework through which extension could reach the majority of farmers in the country. There is a hierarchy of staff, from national level through regions and the RAO's to districts and the DAO's to the individual ADs. This is under the administration of the DAFS, and is located in the MOA along with research and other activities in the agricultural sector. This is better than in some countries where extension is located under a different ministry, or does not exist. ATIP has attempted to take advantage of this organization to implement more effective extension.

b. The extension process is seriously hampered by the low level of preparation of the ADs, and the lack of specialized training of the CPOs and APOs. Although the latter are designated as subject matter specialists, they have not been given the opportunity for specialized training. The ADs and others in the system are also given a wide range of responsibilities in administration of government programs, eg. in drought relief, supervising subsidies for plowing, destumping, and fencing, and distribution of improved seed (programs of ALDEP, FAP, and ARAP). This allows little time for what would generally be considered extension activities, and little flexibility within the current priorities to work with ATIP.

c. The effectiveness of the extension service is also hampered by the lack of locally tested and consistently appropriate technology. Botswana has a difficult and unpredictable climate, with poor soils in many regions which would be considered marginal for field crop production. Given the question of whether or not appropriate technology is available, it is not surprising that extension agents find difficulty in moving new practices to the farm. A closer integration with research would help to facilitate the search for and understanding of alternative technologies, but this is difficult because of the multiple roles which extension agents and specialists must play.

d. There is a critical need for more interaction between research and extension, and between government agencies and farmers. The FS approach provides the framework within which a strategy could be developed to make this happen. Much could be done at local level by ATIP staff working with regional and district offices as well as with local ADS, although this is hampered by the multiple responsibilities of each group. Yet it is critical that each member of the ATIP team place priority on collaborative work with national extension program staff, and not just with counterparts assigned directly to ATIP. This could include involving ADS in surveys and trials, attending meetings of the district DAFS staff, and reviewing preliminary annual work plans with RAOs and other specialists in each district where the project operates. Another effective approach is to continue the emphasis on these linkages at the national level, and assume that decisions and directives from the MOA and director level will provide a greater incentive at the local level for this integration of activities to occur. ATIP could play a central role in this process at both the district and the national level, and this should be a primary activity of the RELO.

e. The ATIP and other FSR projects in Botswana are new, and have not yet had significant and consistently effective new techniques to offer for dissemination of technology. This underscores the need for a long-term time frame in doing FS work.

### 3. Role of the ATIP Team in the Central Region

The FS team has been active in the Central Region, working from Mahalapye, for the past four years. The same TA staff members who initiated the project are still in place, and intend to complete the current contract. This continuity has provided a valuable dimension to the work in this site. Counterparts have been assigned by the GOB, including an assistant sociologist trainee from the DPS. One scientist has recently returned from long-term training for the M.S. at Kansas State University, and is providing an excellent dimension to the work here.

Team activities have concentrated on surveys of several types, field trials, and evaluation of constraints to production. There is excellent rapport with farmers who collaborate with the project. There have been a large number of surveys and field trials conducted, and an immense data bank established. Design of surveys and agronomic trials has followed established norms, and these

trials have been executed well by the team. Data have been coded in a consistent way, and the information can now be retrieved when needed. Much of the data has been summarized, although there is still much to be done in this area. Details of this work have been given in the several project reports.

There has been excellent conceptualization of the FS approach to surveys and field research, and an exemplary collaboration between agronomist and economist at this site. The integration of the efforts of the animal scientist would appear to be minimal to date, in part due to the distance from Francistown where the third technician has been located and his other research responsibilities there. The team has had limited interaction with the district staff of the DAFS, although there have been several seminars/training sessions in which the team has participated. The ATIP team is located in the MOA compound near the other staff members, and this communication should be increased. In summary, there is need for concentration on continued integration of Batswana into team activities, both from research and the local extension office, as a necessary step to localizing the total team activity in the Central Region.

#### 4. Role of the ATIP Team in the Francistown Region

The FS team has been on site in the Francistown Region for the past three years. One of the original TA staff members is still with the team, and two of the current staff have been with the team for one year. Counterparts have been assigned by the GOB, and several Batswana have been sent for long-term training to the U.S.

Team activities have included farmer, market, and institutional surveys in the region, agronomic and animal experiments in the field, and evaluation of principal constraints to production. Maximum yield trials were conducted during the first two years to assess the viability of the current recommendations from experiment stations to solve the major production constraints in the zone. Procedures in these surveys and field trials followed standard norms, and were conducted and analyzed before including the information in reports from the team. Some data from the surveys has not yet been summarized, and this is an important part of the current effort. The team was requested by the RAO to assist with a survey in another area outside the current villages being studied by the team, and this will be a collaborative effort with local ADs.

There has been some integration of activities between the agronomist and animal scientist, and recently an improved integration of agronomy with production economics. ATIP field surveys and experiments have followed standard FSW procedures, and for the most part have emphasized the individual areas of specialization of the TA team. There appears to be some interaction with the regional office of the MOA, and at least potential for much greater collaboration with the Batswana CPOs, APOs, and others in the extension service of the government. The challenge of institutionalizing FS activities at the regional/district level can be faced in the Francistown region by closer communication with MOA staff in the region, and by gaining the cooperation of AD's and others from the MOA on ATIP field activities.

## 5. Role of the National RELO in ATIP Field Work

The role of the RELO was envisioned in the project as a facilitator to bring research and extension activities together, and to demonstrate how this could happen in specific project sites to the benefit of specialists in both agencies. During the first four years of the project, the RELO and his counterpart have taken an active role in visiting extension offices in regions and districts around Botswana, presenting the philosophy of cooperation between research and extension, and seeking ways in which linkages could be built in the regular functions of the MOA. They have become a member of several regional and national committees which involve research and extension coordination.

The RELO has also been instrumental in seeking out research results from the experiment stations, encouraging specialists to write up those results, and catalyzing the publication process of the AGRIFACTS. These extension type publications are distributed throughout the country to crop and animal production officers and to agricultural extension personnel, and form one important linkage within the system.

Research - extension liaison activities have been assigned specifically to the RECU. Yet this function is one of the most critical in any research/extension/development effort and an area which should properly be addressed by everyone on the team. Given the difficulty of explaining the FS process as a unique methodology, and how this fits together with traditional research and extension approaches, there is a need for each specialist on the team to work with local officers in collaborative way. This would be one approach to institutionalizing the FS process, by showing in practice how research and extension people can complement each others work at the local level, to the advantage of each. To a large degree, the RELO can catalyze this local effort, while dedicating most efforts to the broader contacts and issues listed above.

## 6. Role of the Chief of Party in Field Activities

The ATIP Chief of Party is an instrumental person in the conceptualizing, implementing, and management of the ATIP central and field activities. Although each of the specialists on the TA team is experienced in a special discipline in developing countries, and all but one have past field experience in Africa, there is limited expertise on the team in field implementation of Farming Systems Research and Extension. In this technical environment, it is crucial for the COP to play an integral role in the planning of work in each region and in the interpretation of results from the research and surveys conducted.

One of the strengths of the FS process as applied by ATIP is the recognition that each location is unique in some important ways, and that there is no specific set of practices nor methodology which must be used in all sites. In this project, the COP has allowed each regional team to develop its own specific surveys and methods to design and implement field work in response to what the team and the farmer perceive as the most important issues in that region.

This is a noteworthy approach, and a model which could be emulated by other FS projects. One potential limitation of the approach is that nothing can be generalized from the process, and thus each new region or village will have to be studied using a different methodology. It is this search for answers about the methodology which should be important to the COP, and this area is one in which his leadership could be effective in supplementing the efforts of the regional team.

#### 7. Achievements of ATIP and the FSR Methodology

There have been a number of specific achievements by the ATIP, and these have been listed in the response to the log frame in another section (Annex I). Field activities have brought the team into close communication with a large number of farmers, and both have learned from this experience. The farmer surveys conducted by field teams to better understand farming systems, crops and livestock, and income have contributed to a better appreciation of the complexity of arable cropping in a harsh and unpredictable environment. Most of these surveys have been summarized, and the results presented in annual reports and papers developed by the team. The standardization of coding of information from the surveys has been a major step toward making this immense data set more useful, as specific items can be searched through the entire set across individual surveys. This will be a useful tool for future team use of the data as well as its access by others in the MOA.

The field trials have confirmed several components of technology which will work under some conditions. The sorghum variety Segaoiane has been widely accepted by farmers for some time because of its drought tolerance, tillering ability, and grain quality. The early plowing and double plowing approaches can be successful for farmers if there is sufficient rainfall to bring crops along; if not, there is an investment in the plowing which may not be justified. Planting sorghum and millet with a row planter sometimes results in better stands and higher yields, but in some seasons the farmer's traditional approach of broadcasting and plowing in the seed gives better stand and higher yields. The variable responses of crops to these technologies are among the observations which have been valuable during the first four years of the project.

From this experience has emerged the major strategy change that contingency planning or a decision tree approach may be the most viable for these unpredictable climate and poor soil conditions. The ATIP teams are developing a series of options for testing with farmers -- these involve a set of "what if" questions and subsequent practices which are followed under each set of conditions. The farmer's risk aversion strategy of several dates of planting, plowing in the seed to different depths, use of variable genetic materials, and spending as little as possible on external inputs to grow crops probably is rational in this difficult cropping situation. The team is looking for options which are consistent with the goals of the farmer and the economic and environmental constraints which face the family.

## 8. Impact of ATIP and the FS Methodology

Measurable impacts of the ATIP team activities and of the FS methodology in general are difficult to document. This is summarized in the response to the log frame in Section IIA. As a result of the team's work in two regions, there is a better appreciation of how surveys can be coded, stored, analyzed, and recalled to learn about specific farmer practices. One region has requested the team to do a survey in another area for the MOA. This gathering and treatment of data in a broader context than what is normally collected for a specific purpose can illustrate the complexity of constraints to food production and development, and thus have an impact on the work of many agencies in the government.

The on-farm trials which test experiment station technology have been of interest to the research community. This is a way in which they can see their recommendations tested under real world conditions, at a minimal cost to the research budget. The communication which results from this testing and sharing of results should influence not only the agenda of the on-farm systems teams but also the activities in subsequent seasons on the experiment station. The eventual benefit of a farming systems approach to increased farm production and incomes may be difficult to attribute to the approach per se, since it may be expressed as yield of a new variety of sorghum or millet, the water conservation and subsequent yield advantage from an alternative tillage or planting procedure, or an increased total food mix from an intercrop or a rotation of crops. Yet this decision may have been the result of a farming systems approach to seeking out constraints and a perspective which views the whole farm, rather than single component technologies.

## 9. Other Problems and Constraints to the ATIP

The difficulties of articulating the FS approach to research and extension have been summarized in other sections. This is central to the issue of institutionalizing the process, and to giving the MOA a long-term opportunity to take advantage of the integration of disciplines and information which is provided by farming systems perspectives. The challenge of getting the several FS programs in the country to develop a joint document to present to the MOA is illustrative of the different approaches which are represented here and the difficulty in rationalizing these approaches into one methodology and form of organization which could be accepted and implemented by the government. The uncertainty of how to deal with the current proposal reflects the need for more education and orientation of decision makers about the process, and the use of concrete examples to illustrate how the approach can benefit Botswana.

There has been much discussion about the effects of the drought on the results of this project. Although there is no question about the difficult cropping conditions created by low and highly unpredictable rainfall patterns, the ATIP team is currently putting more emphasis on decision making under this set of harsh conditions. Accepting the difficult and highly variable conditions as a given constraint of this environment, rather than an exception

to the norm, gives the teams an opportunity to develop strategies which can result in more stable production and income in this high risk situation. This is a major change in focus since the last review in 1984.

Technologies for use in the project sites should be based on farmer perception of problems and constraints. Researchers and extension specialists should then design trials and demonstrations to address these constraints. The ATIP project needs to work together with national program people of the MOA to reach these goals.

#### 10. Conclusions and Recommendations

From this discussion of the ATIP regional teams emerges a series of specific conclusions which will be summarized, along with recommendations from each one.

a. Given the variability of response to current recommendations from on-station research, there is a critical need for on-farm testing in a wide number of locations to determine the relevance of each component of technology. Although the resources of the project are limited, much credibility would be gained by a closer working relationship with station researchers and a willingness to test new recommendations from the central research staff.

b. There is a national network of extension specialists and demonstrators, although their duties are many and the preparation is not sufficient for all of the requirements placed on them. It would be to the benefit of the team and the extension agents in the regions where the teams operate to work together collaboratively in developing linkages. This would be a form of training, as well as another potential method for moving the FS perspective into functioning national agencies.

c. The research - extension liaison objectives of the ATIP are currently the focus of the RECU. This function should also be given greater attention by each member of the field teams, so that the FS process can have a better chance of also becoming a part of the MOA extension activities in the regions.

d. The RELO has made a major contribution in stimulating the publication of the AGRIFACTS for extension. This should be a logical and appropriate activity to continue.

e. The COP was involved in the initial organization and orientation of the regional teams. Given the uniqueness of the approaches used by each regional team, there is a continuing need for the technical input of the COP in the interpretation of results and the conceptualizing of future surveys and trials in the FS process in each region.

f. An audiovisual approach should be implemented to publicize and describe the FS approach to research and extension and how it is addressing the critical production constraints in the resource poor regions of Botswana.

g. The recognition of how farmers deal with risk in a marginal cropping environment, through cropping and livestock strategies and some empirical contingency decisions, has caused the team to consider new types of technology and ways to describe how low-resource farming might be more successful. This approach should be pursued, and may have great promise for reducing risk and improving production under difficult conditions.

h. The standardization of coding and accessibility of the large data set which has been assembled by ATIP provides a new potential for studying the farming systems of the region and how certain practices may be successful under a given set of conditions. The methodology which is being developed by members of the ATIP team will be useful in other harsh environments around the world, and this state of the art (SOTA) activity should be continued.

i. By the end of the MIAC contract, the ATIP team should have developed one or more SOTA documents which set out guidelines on methodology for farming systems work under harsh and uncertain climatic conditions in Botswana.

## II.C. Station and Commodity Research

### 1. Summary of Objectives and Role

The adoption of a farming systems approach by the Ministry of Agriculture is based on the idea that in order to increase agricultural productivity it is first necessary to comprehend all existing aspects of production. Four projects have been introduced: the Evaluation of Farming Systems and Implementation Project (EFSAIP), the Integrated Farming Pilot Project (IFPP), the Agricultural Development - Ngamiland Project (ADNP), and the Agricultural Technology Improvement Project (ATIP). EFSAIP, IFPP, and ADNP were aimed at testing farmer's reactions to the technical packages recommended by the Department of Agricultural Research, while ATIP is charged with responsibility to improve the capacity of the Ministry of Agriculture's research and extension programme and the linkages between these agencies in order to make recommendations relevant to the needs of resource-poor farmers.

Generally the arable crops have received much less attention in Botswana than livestock, and commodity research has been confined to the screening of sorghum, pearl millet, and cowpea varieties at the central research station and four substations. Commodity research now is focused on the identification of drought avoiding strategies such as breeding and selection of early maturing varieties, increasing soil moisture levels resulting from timing and types of tillage, and development of appropriate production techniques. Thus, the role of agricultural research is to generate appropriate information which may assist government in the implementation of its National Development Plan which seeks to (1) attain self-sufficiency in staple crops, (2) raise rural incomes through production of agricultural surpluses, and (3) create rural employment opportunities to reduce migration to urban areas.

### 2. Performance of AID Supported Commodity Research

#### a. INTSORMIL

The global objectives of the project are to establish cooperative research activities between U.S. universities and national programs to develop appropriate varieties and cultural practices for the production of sorghum and millet. More specifically, in Botswana the project is aimed at strengthening the sorghum and millet improvement program by designing and testing specific components of technology such as fertilizer levels, time and density of planting, water storage, and value of rotations and organic matter residues. An important dimension of the program is training, and one Botswana staff member has been given the opportunity for long-term training in an INTSORMIL university. Other Botswana have received field support from INTSORMIL, and AID backing for study under other projects. Short-term TA visits financed by INTSORMIL have provided technical consulting in the areas of agronomy and plant breeding.

Like other commodity research projects, INTSORMIL is expected to provide necessary backstop support to Farming Systems Research teams in the field. Since INTSORMIL has agronomic trials both on station and on farm, it is considered that in order to make impact on other projects these trials should be concentrated on high priority questions and should complement the work of other on-going sorghum, millet, and cowpea research in the country.

Recommendation:

INTSORMIL research should be designed to complement other research activities already in progress at the central station, should incorporate an active on-farm dimension into the total research effort, and should be responsive to key national research priorities as determined in consultation with Botswana researchers and the Director of Research. There is a critical role for both long-term and short-term TA staff to work with national specialists of the sorghum-millet improvement program in setting priorities, planning specific trials, and specific technical assistance in the fields of breeding and agronomy. There have been excellent contributions from a short-term TA plant breeder, and this type of field consultation should be pursued in other areas. It is important that visiting scientists from the universities in the INTSORMIL project spend less time with administrative matters, and concentrate on communication with national scientists about plans for field research. It is crucial that this planning be done with full participation of national research staff.

b. BEAN/COWPEA CRSP

The role of the Bean/Cowpea CRSP in Botswana is to support and supplement GOB activities concerning cowpea research and strengthen the DAR by training Botswana professional personnel. A major achievement of this project is the collection, cataloguing, and screening of local cowpea germplasm. The collection grew to about 700 accessions and will be used locally as well as in international and other national breeding programs.

Two local counterparts are currently pursuing their thesis research at Sebele. They will receive their M.S. degrees at Colorado State University in December 1986. The third counterpart is pursuing a B.Sc. degree at the University of Swaziland.

Recommendations:

It is essential that funding be continued for the training of the three Botswana currently in long-term study programs. Since there is indication that no other funding will be available under this CRSP in Botswana, no other specific recommendations are made.

c. Seed Multiplication Unit

Seed production has increased dramatically during the past several years. From a level of about 900 tons/year, this has now reached a level of about 4,000 tons/year as a result of GOB priority in this area and cooperative MOA and USAID-financed specialists working in seed production. The MOA has decided not to build a new seed processing building at Pitsane, but instead to upgrade the

current facility of the foundation seed unit at Sebele. UNDP has indicated interest in funding the expansion of the seed building and the necessary equipment. Construction of an irrigation facility (25 ha) is under way. This facility will be operational by the end of 1986 and will be used for the maintenance of foundation seed.

A request for two additional years of long-term technical assistance for a Seed Technologist has been made by the GOB, and that this position be funded by USAID through the ATIP contract. A counterpart to the seed technologist is completing a M.S. degree and should return soon to Botswana. Another counterpart is pursuing a B.S. degree in the U.S. and has three more years to complete the degree. The second counterpart is sponsored by ATIP. These two specialists will assume the duties for contracting with growers, supervision of crops and certification in the field, seed plant functioning and maintenance, and supervision of the laboratory activities for assuring seed quality. This will be a localized program when the two technical staff return.

Recommendation:

Given the national importance of a continuous and sufficient supply of quality seed, the team recommend the continuing priority on this effort and especially the training of non-professional personnel such as field technicians and seed plant operators who can take on the day to day operation of the plant and the seed testing laboratory.

3. Station Research

On-station research is one key to improving crop and animal productivity, and is one of the foundations to increasing production in the country. This is universally recognized and accepted. The challenge is to determine research priorities, decide what should be done by whom and in what location, and how research can address the critical constraints in production and the adoption of appropriate technologies.

As farming systems teams have evolved towards greater emphasis with on-farm research and testing, the need for a close collaboration with on-station research becomes evident. It is critical that on-farm research be designed in collaboration with national research personnel and that this choice of priorities be determined through dialogue among those concerned with specific research areas in interpreting information from farmers. It is important for on-station and on-farm research scientists to examine the relevance of trials which are conducted by both groups, and this can only be done by a continuing process of communication and sharing of information on current and past results and recommendations.

Contrary to the frequently expressed view that there are no packages of appropriate technology available, the DAR has released many varieties of dryland crops, recommended the use of cereal/cowpea rotations, and recognizes the need to study mixed cropping systems. The Farming Systems teams in the country should take into account these recommendations in deciding which practices to test, and provide as much feedback as possible about these

recommendations to the research specialists at the experiment station.

Recommendations:

Farming systems teams should pay close attention to the national agricultural and development priorities as they are carrying out research in the harsh realities and limitations which form part of the environment in which food production and other national activities take place. Attention should be given to closer collaboration with the national research teams to test under local conditions the technologies proven as feasible by on-station research.

In the absence of well-trained subject matter specialists at the regional level (CPOs, LPOs), the ATIP field team and RECU should all work together to bridge the gap between research and extension by attending extension as well as research meetings in an attempt to understand and help solve problems faced by each group. The RELO should continue to play an important role in the publication of AGRIFACTS.

II.

D. Extension

1. Project Objectives on Extension During the LOP

The purpose of the project is to improve the capacity of the MOA's research and extension programs to develop and extend FS recommendations relevant to the needs of small farmers in selected pilot areas. Two of the project's three sub-purposes are largely concerned with agricultural extension. These are: (1) improve the capacity of the Department of Agricultural Field Services (DAFS) to transfer appropriate technologies and strengthen linkages between research, extension and farmers, and (2) provide Botswana's farmers in pilot areas with relevant innovations in agricultural production technologies and methods through field trials, demonstrations and farmer training.

Technical assistance is being provided at the national level to improve the linkages between the DAFS and the Department of Agricultural Research (DAR). This is accomplished by a long-term extension specialist serving in the RELO position in the DAFS, short-term consultations, and some participant training, commodities and other costs.

2. The Research and Extension Coordination Unit

To make Farming Systems work it is essential to have excellent cooperation and working relationships between research and extension people on the FS teams. Since this project operates at both the national level and in two pilot areas, to assure good communications between research and extension, the project funded a position for a Research and Extension Liaison Officer (RELO) in the MOA in Gaborone. The positions of the RELO and his Motswana counterpart were established in the Research and Extension Coordination Unit (RECU--also initiated with this project) in the Crop Production Division, Department of Agriculture Field Services (DAFS), MOA.

Although the RECU has made an effort to fulfill its research and extension coordinating role, especially in food crops, several factors have mitigated against its effectively doing so. One problem is that the RECU comes under the Crop Production Division of the DAFS, and therefore has no authority over several other Divisions and Departments whose full participation and cooperation are essential for making FS work. These other offices include the Animal Production Division, Land Use Division, and Agricultural Information Section (all in the DAFS); the Department of Agricultural Research and Botswana Agricultural College (BAC), which report directly to the PS and Deputy PS; and the Division of Planning and Statistics, which provides economists and an assistant sociologist for the project.

The RECU has difficulty filling its research/extension coordinating role even within the Crop Production Division, which provides technical support to the Crop Production

Officers (CPOs) at the regional level. The CPOs in turn are supposed to provide technical support, assistance and training in crop production matters to Agricultural Demonstrators (ADs), the extension agents in the extension areas and villages in the 22 Agricultural Districts in Botswana. An example of this difficulty appears in the summary section of the report on the FS workshop for crop production officers at the Denman Rural Training Center (RTC) held on June 28-29, 1983.

"After completing the discussion on the case study farm family situations the matter of relevance of the FS approach to agricultural extension activities was again raised. At several points in the program speakers asked for discussion on this matter and on the desirability of additional training in FS methodology. The Agricultural Officers did not answer the question directly, but instead raised a major issue: What is the attitude and opinion of administration officers of DAFS on the usefulness of the FS approach?

Several crop officers felt that there was little administrative interest in the Farming Systems Approach because no administrator from DAFS had attended the workshop. They felt that until some real interest in and support for the Farming Systems Approach are demonstrated by administration, that it will be a waste of time for field staff to study and develop the technique further."

Similar indications of the project's inability to muster much interest and cooperation in participating in FS work by DAFS regional, district and AD staff (except for those AD's who were seconded to the project) is contained in the project reports and was mentioned by several people during the evaluation.

Why this failure to get full cooperation of DAFS national and field staff in FS? Many reasons have been given. It might be as simple as what J.A. Hobbs (the first RELO) reported in his report "Research/Farming Systems Teams/Extension Relationships and Agricultural Development in Botswana" (File:SWM.070/MP.85.10, date: 22/7/85).

"The fact that ATIP and the other new FSR projects have developed little in the way of appropriate technology that can be passed to extension officers for transmittal to farmers has prompted us to broaden our (RECU) activities (beyond the ATIP Terms of Reference [TOR])."

FS has not been "institutionalized" like the ARAP and ALDEP programs, which the DAFS staff at all levels "must" implement; and which, together with other national programs (in addition to normal advisory and extension roles), keep them fully occupied. The fact that FS is not institutionalized (and perhaps will not be, in the absence of some clearly conclusive and positive results) is a major problem here. It is also questionable, even if it were institutionalized (or otherwise formalized by government) that it would really get the

necessary support at the field level. Field people appeared to the evaluation team to be heavily overworked and very busy implementing national programs. Their work schedules and activities appear to be set by MOA directives and do not always reflect the full scope of their job descriptions.

The main "purpose of the job" in the present job description for Crop Production Officers (CPOs) states:

"Provides a link between the Chief Crop Production Officer and the Regional and District Extension staff and farmer in carrying out recommended improvements in crop production. Also serves as the link person between extension staff and the Research Department, ensuring a two-way flow of information."

If this is in their TORs and they are not cooperating in FS work, then what degree of institutionalization will it take to get them to participate? Perhaps the best that can be expected is for them to be receptive, show interest, and keep informed on what is going on with FS work in those districts and regions where FS projects exist at this time. Perhaps the ATIP would be in better standing and have better support from field services if it came under DAFS, (like one of the other Botswana FSR projects does) rather than DAR.

3. Major Accomplishments of the RELO/RECU To Date  
Include:

(a) Committee Activities:

Attends, as national level research/extension coordinator, the annual Arable Agriculture Development Committee (AADC) and Arable Research Priorities Committee (ARPC) meetings. The RECU is also represented on the Southern Region Committee and the new DAFS National Training Coordinating Committee.

(b) Liaison Activities:

1. Conducted a survey and evaluation of problems affecting extension efficiency and crop production improvement. Problems considered most important constraints to extension efficiency and crop production improvement by extension workers were those that impinge most directly on the worker--personal matters such as housing, evaluation and promotion, lack of transport and lack of long-term, short-term and in-service training opportunities.

2. Made presentations on research-extension liaison at in-country (Southern Region) and international (Lesotho) conferences and workshops.

3. Took the lead in coordinating the updating and reissue of the AGRIFACTS extension circulars and the Agricultural Extension Handbook. It had been decided at a meeting between the Chief Crop Production Officer (CCPO) and Chief Arable Research Officer (CARO) that these extension materials were incomplete, out-of-date, and that most ADs, DAOs, and other extension staff no longer had copies.

4. Organized Semi-annual Regional Crop Production Officers' Conferences to discuss items of importance in crop extension and research/extension linkage, especially the FS approach to research and extension. The RECU feels that as long as there are major differences between research and extension workers (especially extension staff at the RAO, subject matter specialist [such as CPO], DAO and AD levels) in such areas as level of education and professional training, they are not likely to work together collegially in FS work.

Although the regional extension staff (such as CPOs, LPOs and HOs) are supposed to be BS level, many are not. Moreover, even with BS degrees, they are not really subject matter specialists. They have all had pretty much general training.

5. To help resolve some of the problems relating to level-of-training, career development, and lack-of-opportunity for long-term, short-term and in-service training for extension staff, the RECU took the initiative to propose and establish the National Training Coordinating Committee. The Committee was established in November 1985 and looks very promising. One thing the Committee is proposing is that most of the remaining LT training opportunities available under the ATIP (the 15 person years LT training that will be funded by the GOB) be for MS training for DAFS staff in skill areas essential to future FS work and effective research/extension coordination. Hopefully, the committee will also accept and begin implementing the recommendations of the R. L. Johnson extension training consultant report, especially as it relates to in-country and in-service training of extension workers in the FS approach at the BAC and RTCs throughout Botswana.

6. Visit RAOs and their staff to find out what their perceptions and needs are in the areas of upgrading field extension staff and creating better linkages between research and extension.

7. Attend, when possible, DAO Monthly Management Meetings. These meetings serve as the opportunity for DAOs and RAO subject matter staff (including LPOs, CPOs and HOs) to provide in-service training, guidance and technical assistance to the DAOs and their AD field staff. Unfortunately, however, there are 22 districts; almost all of the DAOs hold their meetings the last week of the month; and the RELO and his counterpart cannot possibly attend on a

regular basis. The RELO advised that he had attended DAO Monthly Management Meetings in Mahalapye East only two times since he has been here. The evaluation team suggests that he and his counterpart should concentrate on attending these meetings in the districts where the ATIP is being implemented.

One of the other on-going FS projects in Botswana comes under the DAFS at the regional and district level and apparently does not have as serious a research/extension coordination problem as ATIP.

8. Conducted a study on the apparent lack of effective two-way communications between extension and research workers--to identify additional ways that the RECU could help in this area.

(c) Short-Term Consultancies

The present and previous RELO have arranged for some of the ATIP short-term consultancies. The most noteworthy, perhaps, on the research/liaison side, was the R.L. Johnson consultancy on A Suggested Program for In-service Training for the DAFS, in June/July, 1984.

(d) ATIP Administration

The RELO serves as the Deputy Team Leader for the ATIP project.

(e) Operational Constraints

Major constraints to improved extension/research coordination in the ATIP project include:

1. Inadequately trained and staffed extension service filled with people who are heavily overworked and who have the implementation of other national development programs (such as ALDEP and ARAP) much higher in their work priorities than working with FS teams.
2. Differences in professional training levels and attitudes between research and extension staffs.
3. Inadequate recognition of FS as an effective approach to doing research and extension.
4. Positioning of RECU at a level where it has no authority (or sufficient status) to coordinate the various research, extension and training aspects of FS.
5. Failure of the FS teams to communicate effectively with DAFS staff in the field.
6. The perception by many key people that FSR has not yet shown that it can deliver in terms of coming up with something that can significantly increase agricultural production in Botswana.

4. Problems Affecting Extension Efficiency and Crop Production Improvement

Problems considered most important deterrents to extension efficiency and crop production improvement are those that impinge most directly on the extension worker--personal matters such as housing, evaluation and promotion, transportation, career development and training--both long-term, short-term and in-service. Extension workers do not generally feel that extension effectiveness or crop improvement are kept low by a lack of technical innovations. Many extension workers feel that they are ill equipped for their posts. As a result of this they have a low opinion of their ability to develop meaningful projects and programs for their areas. The fact that housing, equipment, transport and financial support is minimal adds to their frustrations and causes real problems.

5. Other FS Projects in Botswana

(a) General

Other donor FS projects in Botswana do not profess to have the same research/extension coordination problems because they are regional projects and/or come under the direction/leadership of DAFS. They also do not have a mandate to coordinate research and extension at the national level.

(b) Other FS Projects

(1) EFSAIP (Evaluations of FS and Agricultural Implements Project) started in Sebele in 1976 with British funding. It was the first multi-disciplinary project designed to test agricultural technologies on farmers' fields. It was attached to the DAR. Although it was not initially designed as a FS project, it took on the aspects of FS after the first few years, when its focus was switched to development and testing of alternative farm machinery and cultivation practices compatible with the standard row-cropping system recommended by the MOA. Systems description/diagnostics became an important aspect of the project. EFSAIP had no formal ties to extension, but it pioneered the use of the extension service in the dissemination phase of its program.

(2) IFPP (Integrated Farming Pilot Project) was also initiated in 1976 with British funding and was planned largely as an extension and infrastructure development project. It is now called FSSR and is based in Southern Region. One purpose is to farm-test new cultivation practices developed by research. It comes under the DAFS and operates out of Pelotshetlha, Southern Region.

(3) Agricultural Development Ngamiland Project (ADNP) was started with Swedish Aid (SIDA) in Gomare (Ngamiland Region) in 1979 and was the first project actually designed as a FS project. Its major objectives were (1) to design, develop and promote appropriate agricultural technology packages for different socio-economic farmer groups--with particular attention to resource poor farmers, and (2) to provide useful information to interested agencies about circumstances of farmers in different areas. Unlike FS in other areas of Botswana, farming in Ngamiland is dominated by maize and many farmers rely on crop production for their primary livelihood. Phase II ends in 1986 and Phase III is expected to start shortly.

Although these and the ATIP project have all made progress in terms of better understanding farmers and production systems, it is still difficult to predict the real long-term crop production benefits of these FS efforts.

## 6. Technologies and Packages Available

### (a) ATIP and Other FS Projects

As far as proven extension recommendations are concerned, the previous RELO summed it up in one of his reports in 1985 by stating:

"ATIP and the other (new) FSR projects have developed little in the way of appropriate technology that can be passed to extension officers for transmissal to farmers."

In referring to the impact the drought has had on the ATIP project, the Mahalapye team commented (Research Paper No. 1) as follows:

"An inability to identify clearly profitable alternatives for farmers has meant that little headway has been made in dissemination stage activities." "In general, when there are no clear solutions to farmers' problems, a longer time horizon is needed for FSR."

(b) Common extension service recommendations in the project areas include early (post harvest, winter or spring) plowing, early planting, weeding, row planting, fencing, improved seed varieties, destumping, contour plowing, crop rotation, fertilizer use, manure, and undersowing sorghum with cowpeas. Common radio extension messages include: plow and plant early, fertilizer use, manure, weeding, moisture conservation, thinning, and bean intercropping.

## 7. Extension Worker Perceptions of FS and Research/Extension Linkage

It is an often expressed belief that one major reason extension staff have not cooperated much in the FS efforts in that they do not have a proper understanding of research and the FS concept and approach.

The evaluation team found that the senior level extension staff in Francistown had a very good basic knowledge of FS. They expressed concern that some things ATIP is doing is not really FS. They knew that ATIP was doing excellent diagnostics work and information gathering on farm families and farming operations. They also knew that ATIP had done excellent studies to gather information on farmer perceptions of their major problems and production constraints. They felt, however, that the ATIP was not focusing enough attention on many of the important problems identified by farmers, but rather on what they themselves had decided to do research on. They also felt that the ATIP team had ignored some good suggestions that they had offered.

#### 8. Factors Inhibiting Progress

Factors inhibiting progress in FS work in Botswana were summarized by ATIP staff in a paper presented at the Networkshop of Senior Agricultural Research, Extension and Teaching Personnel of Eastern and Southern Africa in Maseru, Lesotho, November 25-28, 1985. The constraints were categorized under the headings of environment, technology development, support systems, credibility, personnel, and evaluation criteria. Pages five and six of the presentation are attached as Annex J.

#### 9. Conclusion and Recommendations:

##### (a) Conclusion

Agricultural extension is an integral part of FS work, and strong linkages and cooperation between research and extension are essential for FS to succeed. This necessary linkage has not yet been satisfactorily made in the case of the ATIP project in Botswana. Although there has been some progress, the agricultural extension service (DAFS in the MOA) has not embraced the FS approach to research and extension at the national level nor in the Central and Francistown Regions, where the ATIP project has field teams.

##### (b) Recommendations

(1) The responsibility for establishing effective linkage relationships between research and extension should rest with everyone on the ATIP project, not just the RELO and his counterpart in the RECU. People at the FS team level should do everything they can to establish good working relationships--formal and informal-- with DAFS staff at the regional, district and AD levels.

(2) The ATIP COP should have a strong and energetic counterpart, with good interpersonal relationships with other MOA departments at the national level, who can also help to take over part of the responsibilities of liaison with the extension service, BAC, DPS and other government agencies. The team also needs a capable and effective administrative assistant. This would help to free up the RELO from some of

his Deputy Team Leader administrative duties, so that he can get about his more important responsibilities of creating and fostering truly effective linkages and liaison between research, extension and training--in the true spirit of Farming Systems.

(3) The organizational positioning of the RECU should be moved from the Crop Production Division to a higher level in the MOA. The RECU cannot effectively coordinate necessary FS activities (livestock, crop and land use extension; BAC and RTC training; the DAFS Information Section; DPS FS responsibilities) with research (especially ATIP and other FSR projects) when it--the RECU--comes under just one division (Crop Production) of the DAFS. We recommend that the RECU be elevated to come either under the Office of the PS (or Deputy PS), or under the Division of Planning and Statistics. We also recommend that the RECU be assigned additional staff, so that it can more effectively perform its responsibilities, which are key to the success of this project.

(4) Additional long-term professional training slots should be made available under the ATIP and other projects for upgrading MOA field service officers and extension trainers, as well as research staff. Training in the FS approach to extension should be part of their training programs. If FS is not a part of their course work, they should be given every opportunity to attend FS summer short-courses and workshops while they are undertaking their long-term training programs, plus whenever else the opportunity arises.

(5) Special efforts should be made to provide short-term FS training and in-service training opportunities to high and mid-level members of the DAFS. The more this project can do for them in terms of exposing them to successful FS efforts--both in Botswana and elsewhere, the better. Study tours should be arranged for them to visit other FS projects where extension is playing a major role in FS efforts, IARCs, and other countries where national extension programs are operating in a more effective FS style.

(6) Extension messages are presently broadcast on the radio in Botswana. This should be encouraged in every way possible. One useful addition to this use of mass media communication would be to make an attempt to add site-specificity to the broadcast messages. For example, if there are specific sorghum varieties which have been more successful than others in a certain region or district, or under certain soil conditions or farm characteristics, it would be good to say so in the radio broadcasts, rather than make all the messages general for the entire country. DAFS staff at the regional level could pass on useful information of this type for the region and districts to the radio station through the Agricultural Information Section of DAFS in Gaborone. Other means of mass media use, such as audio-visual aids, posters and extension circulars should also be encouraged. The RECU should take the initiative in this whole broad area.

(7) The RECU should also take the initiative in seeing to it that the momentum started two years ago in updating the AGRIFACTS circulars and Agricultural Extension Handbook be continued and completed.

(8) The RECU representatives should play a more active role in the many meetings and coordinating functions they participate in. It appears from the project files and reports that they may play a relatively passive role, even though they were initially responsible for setting up or helping organize the meetings. This does not only apply to extension training coordination meetings, but also to the Arable Agriculture Development Committee and Arable Research Priorities Committee (and similar) meetings which are held jointly by DAR and DAFS officers.

(9) The recommendations of the R. L. Johnson consultant report (and other good recommendations concerning long-term, short-term and in-service training at the BAC, RTCs and other training facilities) should be followed-up actively by the RECU. The National Training Coordinating Committee organized with a good deal of enthusiasm in November of last year must not be allowed to fall by the wayside like the earlier in-service training committee did.

(10) Training slots which are made available by the GOB and AID for the ATIP project (especially for the DAFS) should be recognized as being part the ATIP project--in the best interests of promoting the farming systems approach to research and extension.

(11) The present Motswana officer assigned as counterpart in the RECU to the RELO is departing for long-term training this summer. One of the long-term participant trainees presently in the U.S. is supposed to take over his slot in the RECU. Everything possible should be done to see to it that the returning participant be assigned to the RECU and not transferred to another position.

(12) The role of DAFS staff in participating in FS work should be clarified and properly defined for everyone concerned.

## II.E. SOCIOLOGICAL DIMENSIONS

### 1. Beneficiaries

The Project Paper states that the target group involves farmers having between one and ten hectares of arable land and owning 40 or fewer cattle. A substantial proportion of farmers are women and it was projected that at a minimum 40% of the beneficiaries would be women. The PP implied another beneficiary category: the Batswana who would be trained under the project. The draft Project Amendment No.4 specifies that 20 Batswana will benefit from degree training.

The work which ATIP has done to specify potential farmer beneficiaries is highly commendable. The stratification of farmers largely by critical resources and the matching of trials with stratification category signifies that an important element in farmer acceptance of technology is built into the FS research method. The potential beneficiaries encompass farmers in almost all socioeconomic strata in the research sites and comparable areas. Attention given to low resource farmers helps assure that female headed households are included since they tend to be in this category. The role of women in crop production and goat raising is addressed by ATIP and demonstrated by their working directly with women farmers and ensuring that field staff teams include female members.

The project includes both direct and indirect beneficiaries. The direct beneficiaries include (a) the GOB staff who receive long-term, short-term, in-service and on-the-job training, (b) farmers within ATIP villages who informally receive technical advice from project staff, and (c) male and female farmers who participate in trials. The latter receive benefits in the form of technical advice and instruction, sometimes agricultural inputs, and feedback on husbandry practices. The intended indirect farmer beneficiaries are those within ATIP villages and elsewhere operating under similar conditions for which technical recommendations are identified. It is anticipated that they will benefit through increased production, primarily for domestic consumption. A second group of indirect beneficiaries are farmers who have greater access to seed because of the work of the seed multiplication specialist. A third category would be BAC students, if teaching of the FS approach is incorporated into the curriculum of agricultural students.

Particular characteristics of the farming household are likely to influence farmers' reactions to the trial and perhaps the management practices used on FM-FI trials. These are important to assess in terms of the acceptability and performance of technologies. Table I indicates the stratification characteristics of participants in the ATIP Mahalapye Farmer Managed - Farmer Implemented Trials and Researcher Managed - Researcher Implemented trials superimposed on farmers plots Annex F presents more information. Table 2 presents the stratification variables of the households which participated in the 1984-85 ATIP Francistown trials.

Table I:

ATIP Mahalapye Trial Participants: 1982-83 through 1985-86 Cropping Seasons

<u>Year</u>	<u>TOTAL</u>	<u>MALE</u>	<u>FEMALE</u>	<u>RICH</u>	<u>POOR</u>	<u>CONT.</u>	<u>DEP.</u>
1982-83	24	15	9	14	10	13	11
1983-84	88	64	24	48	40	56	32
1984-85	82	54	28	38	44	48	34
1985-86	129	86	43	29	31	89	40

MALE - Male headed household  
 FEMALE - Female headed household  
 RICH - More than 15 head of cattle  
 POOR - 0 - 15 head of cattle  
 CONT. - Draft Control  
 DEP. - Draft Dependent

Table 2:

ATIP Francistown Trial Participants: 1984-85 Cropping Season

		<u>Number of Participants</u>
0 Cattle		4
1 - 15 head of cattle		12
16 - 35 head of cattle		9
36 - 70 head of cattle		3
over 70		2
Traction*:	Donkeys	7
	Cattle	23
	Tractor	11
Draft owned		21
Draft borrowed		9
Draft managed		2
Draft Co-owned		5
Draft Hired		13
Draft Arrangement		1
Family Help		1
Male		14
Female		16
Head Under 35 years		4
Head 35 - 54		13
Head over 54		13

\*Multiple responses recorded

## 2. Provision of Sociological Technical Assistance and Training.

The Project Paper specified that the GOB would provide the services of a sociologist for ATIP. However not until late 1984 was a person assigned by the GOB from the Rural Sociology Unit within the Division of Planning and Statistics of the MOA. Because of the Unit's responsibilities and limited number of professionally qualified staff, the person appointed had only diploma level training, no formal sociological or anthropological education but had on-the-job training whilst working for the Unit and had additional experience working as an assistant to two OPEX anthropologists. This junior status prevented a substantive Batswana sociological input, but the person was able to receive valuable on the job training during the months he was actively involved with the Mahalapye ATIP team prior to being sent for degree training in the US in December 1986. His training program needs to be carefully monitored and if his course work does not include FS then arrangements made for him to attend special summer courses, such as the one given at the University of Florida. The vacancy created by his departure was filled in late 1985 with the assignment of a female member of the Rural Sociology Unit who had worked with the Unit for approximately 2 years, has a Cambridge certificate, outstanding qualities in regard to rapport with farmers and good interviewing skills.

For the Rural Sociology Unit to provide a substantive backstopping role for the sociology trainee, they need greater experience in FSW, such as interpretation of socioeconomic and technical data for identification of technologies to be tested. As part of building this expertise, and following a recommendation in the 1984 evaluation of ATIP, the Senior Rural Sociologist attended the FSR Symposium at Kansas State University in the fall of 1985, had follow-up consultancies with FSR-experienced rural sociologist at the University of Florida and met with the consultant who had been identified to work with the RSU on FSW.

The 1984 evaluation of ATIP also recommended that sociology input to the teams be achieved by a series of three to five month research/training consultancies with ATIP and the Rural Sociology Unit of the MOA. With a list of potential candidates supplied by FSSP, the head of the Rural Sociology Unit and ATIP COP selected the most qualified candidate and requested his services for early 1985. This sociology consultant arrived June 9th, 1986 during this evaluation for an eight week assignment. It is anticipated that ATIP will take the necessary actions on recommendations contained in his consultancy report.

## 3. Socioeconomic Factors

In contrast to most FS projects in Africa, ATIP socioeconomic research has been guided by a farming systems perspective to highlight human factors influencing farm management and farm productivity. This permits assessment of

the role of crop production in the system and the important linkages among crop production, livestock and other activities, especially those which generate income for the system. This is particularly important for Botswana, where livestock is generally more important than crops in farming systems and where wage employment and remittances are essential to a large proportion of low resource farmers. ATIP crop research has been hampered by the years of drought but the extensive socioeconomic research has been able to utilize this time to learn much more about how Botswana farming systems function in bad years. This is critically important in drought prone areas where farmers' acceptance of technical innovations is conditioned by their drive for stability or security during drought. At the same time the linkages of farming systems to certain interhousehold and institutional environments have been assessed for their influence upon the farming system. An understanding of necessary resource, social structure and the interplay of enterprises is essential since these influence how people assess agricultural production innovations, although within any given farm household these factors can vary over time. Extension of a proven technology needs to take into account the critical factors which determine the ability and desire of households to adopt the technology.

The stratification of households into recommendation domains has been based on factors endogenous to households. Initially in ATIP Mahalapye, RDs were based on the type of traction used and access to draft, i.e., control versus dependence on others. These categories were used since traction was hypothesized to be one of the most important factors influencing timeliness of planting, hence plant stand achieved and, ultimately yield. The secondary classification variables are the sex of the household head and the number of cattle owned, i.e. 0-15 head versus more than 15, as an indicator of wealth. The ATIP Francistown team used a different approach. After an exploratory survey of the district, it was decided to select villages with differing cattle ownership patterns. Based on a survey in each of the 3 villages, the first step in selecting households was to stratify them by their resource endowments. Using cattle as a proxy indicator, four categories were chosen: the highest one included households owning 30 or more cattle, and the lowest category of farmers owned no cattle. After this stratification, secondary variables were used to select households to represent the following activities and conditions:

- (a) Male and Female Headed Households
- (b) Households with smallstock (goats and chickens)
- (c) Households with and without wage earners
- (d) Households using different types of draft power: tractor, cattle and donkeys
- (e) Households having differing access to draft power: owned, hired, borrowed, and mafisa'd
- (f) Households using different methods of planting: broadcast and row planting
- (g) Households with destumped and partially destumped lands
- (h) Households with fenced and unfenced lands

The coverage of endogenous factors in socioeconomic studies has varied significantly between the ATIP teams, with the Mahalapye team giving more emphasis to these factors. In Botswana where extensive agriculture is practiced and rainfall is more of a limiting factor than land, timely access to draft and sufficient labor are important factors in crop production. Access to draft has been covered in the Multiple Fiset Resource Utilization surveys of a small number of households visited twice weekly, as well as data by activity on type of draft used, frequency, means of access, number of hours, and payment. In addition, ATIP Mahalapye has included questions on activity, type of draft used and means of access in special subject surveys covering a larger sample of farmers. In both regions special surveys were conducted on livestock practices and a livestock inventory is being kept on a small sample of households.

In the ATIP Mahalapye villages labor data have been collected in the MVRU, some special surveys, and the 1984-85 End of Season Farmer Assessment. During the first two years the MVRU survey included information on non-income producing activities, but the revised survey collects data only on 5 fieldwork activities and non-cropping income generating activities by age/sex category, number of hours and dates. The crop labor use data encompasses household and non-household members. Because of the small number of MVRU households in 1984-85, an activity survey was administered monthly to households; this included questions on labor inputs in six categories of income-producing activities, by age/sex category and frequency. The Crop Protection, Harvest and Utilization Survey and the 1984-85 End of Season Farmer Assessment covered information on drop-outs and additions to the crop labor force.

In comparison, in Francistown the MVRU survey has been the only instrument which has included labor data. It covers arable and income-related labor activities. For the latter, information is gathered on output and type of payment. By activity, the labor data are collected by age/sex category, and number of hours for both household and non-household members. Other surveys did include questions on who was responsible for different activities.

Since investment of resources in crop production should be viewed vis a vis other income generating opportunities and household economic diversification strategies, information is being gathered on off-farm income as well as income from livestock. The MVRU surveys collect information on sources of off-farm income. Also an attempt has been made to get data on the amount of cash and in-kind income flowing into the farming household.

While cropping choices potentially influence the acceptance of new technologies, the data from the two regions show little variation in the types of crops grown. Nevertheless, the types of crops and varieties grown are being monitored in both regions. In addition, the first Mahalapye MVRU survey (1982-83) asked about any changes in varieties of

sorghum, maize and cowpeas grown over the past 5 years.

Farmers' views on farming problems and the advantages and disadvantages of different practices under good and bad rainfall conditions are linked with their willingness to try new technologies. This type of information is being collected in both regions in surveys and assessments by farmers of trials in which they have participated. Willingness as well as ability to try new technologies relates to

- (a) who makes resource allocation decisions relating to particular activities and sub-systems,
- (b) perceptions of benefits and hurts from changes in sub-systems vis a vis other household members
- (c) management procedures and
- (d) resource parameters.

Data on these topics were collected in the ATIP Mahalapye Decision Unit - Management Information (DUMI) Survey administered to 50 households.

Almost all the surveys assume that the farming household operates as unified economic unit in regards to de facto land control and decision-making powers over and management of the inputs and outputs from parcels farmed, while this may vary significantly depending on the definition of household used. The intent has been to focus on the nuclear household as the unit of study, but gather census and other critical information on extended household members who contribution to the resources of the household. That this is the actual unit on which field data collection is based needs to be confirmed since it influences what interhousehold and intra-household variables on resources and on gender considerations ought to be stressed. Moreover, what definition of household ought to be used in FSW in Botswana?

A potentially significant project impact will be an increase in domestically produced food consumed by the household. The Mahalapye studies have the potential of providing indicators on source and frequency of food by consumption category and the amount of money spent on food. The Activity Survey 1984-85 also collected estimates on the total amount of sorghum, maize and milk consumed during the month. This type of information has potential use in assessing changes in source and amount. (Similar information has not been collected by the Francistown team). The survey might be revised if it is found that there are sub-production and consumption units within a significant portion of households which need to be identified.

In spite of pointing to some areas where further clarification might be useful, it is clear that the emphasis of the ATIP economists related to socioeconomic factors should be placed on finalizing analyses of data already collected, focusing on farmers' assessments of trials, and identifying the critical resource and decision-influencing factors which should be collected in future FS work in Botswana.

Problems and Constraints.

To help in clarifying a FSW methodology for Botswana three items need more careful assessment. The first is the definition of household used by ATIP (i.e. extended or nuclear) and the implication of this to the willingness and ability to adopt new technologies. Second, what are the main intrahousehold variables which need to be incorporated into future FSW? Third, do the variables used to stratify farming households actually underscore major differences?

Methodologically, there has been exclusive reliance on structured questionnaires, the formulating of which did not grow out of prior in-depth interviews. More attention needs to be given to farmers' assessments of trials, including assessments expressed in farmer groups, a mode ATIP has begun to use for contact with farmers. Currently both ATIP teams administer structured questionnaires to farmers involved in trials. There is no method for field staff to systematically inform the technical teams of answers to probing questions about technology, or to relate more spontaneous and casual reflections expressed by the participants. Further, no mechanism has been developed to obtain the views of non-participating farmers who might be negatively affected by the technology or who may have different perceptions.

The farmer group mode seems to be a viable method for working with farmers. However, it is unclear whether or not the groups should be based on stratification variables. Also, using a group approach to extension of technologies needs to be investigated.

In addition, it appears that the field staff responsible for administering questionnaires and collecting qualitative data in the future should improve their interviewing skills. This also holds true for skills in use of farmer group sessions as a feedback mechanism on the technologies being tested. In addition, a methodology should be established in regard to training data collectors each time a new form is introduced. The RSU lacks experience in developing questionnaires for micro-computer processing, and the requisite skills in use of the microcomputer. The experience that ATIP has should be drawn upon.

Except for teaching interviewing skills and helping to develop a training method, the RSU would be unable to assist ATIP with the above assessments. Therefore, the short-term sociology consultant has been asked to address some of these questions.

The GOB was to provide a sociologist for ATIP but the expected level and extent has not been forthcoming for reasons discussed. The gap in professional input has been adequately filled by ATIP, particularly ATIP Mahalapye. The issue, however, is how to institutionalize a sufficient sociological input for the remainder of ATIP and in future FSW in

Botswana. It would be dangerous to assume that other expatriate economists on ATIP and the BS and MA level Botswana economists on future FS teams would have the methodological and technical skills to provide the required sociological input into FSW. The proposal to institutionalize FSW in Botswana calls for the part time input of sociology into the regional FS teams. With the limited number of professional staff in the RSU and many demands upon them, the RSU role ought to be delineated.

What are the critical intervention points where a professional sociologist needs to be involved in FSW? These are:

- a) designing and testing questionnaires and other data collection techniques such as open-ended interviewing and specifying the information to be collected in farmers' assessments of trials and methods to be used in collection of this information;
- b) training of 'trainers' in interviewing techniques and training of enumerators/data collectors in regard to each new questionnaire, or the actual carrying out of critical training sessions;
- c) seeking alternative ways in which the data should be analyzed;
- d) helping with the interpretation of information from farmers for identification of types of trials to be undertaken matched with farmer stratification category;
- e) identifying stratification indicators to be used and criteria for selection of trial farmers;
- f) review of annual work and development of annual plans, taking into account information from farmer assessment; and
- g) carrying out of special studies

Even though a state of the arts document is expected to be completed by ATIP which would provide guidance on (a) and (e) the ability to make modifications and changes is essential in the long run. A major constraint to carrying out most of the critical functions listed above as well as direct assistance to ATIP is the limited professional expertise available in RSU and only cursory familiarity with FSW.

#### Conclusions and Recommendations

In general ATIP has adequately included a sociological dimension in the data collected, stratification of farmers, and selection of farmer cooperators for data collection and trials, also they have been sensitive to the participation of women and to the gender bias inherent in many technologies. However, greater attention need to be given to institutionalizing this through enhancing the capacity of the RSU.

1. Arrangements should be made for further education of the current ATIP assisted sociologist.
2. Professional members of the RSU should be sent to short-term courses, seminars/conferences and workshops on FSW.
3. Further short term consultancy services of a rural sociologist/anthropologist should be provided at least three months per year to assist ATIP and the RSU. In addition USAID should take advantage of other opportunities to provide consultancy services to RSU.
4. Professional members of the RSU ought to become more involved in some of the critical intervention points of ATIP activities.
5. If additional funds for long term training become available, at least one more member of the RSU should be sent for degree training.
6. ATIP records on long-term and short-term trainees should indicate the sex of the trainee.

## II.F Technical Assistance

1. The contractor for the ATIP project has been the Mid-America International Agricultural Consortium, MIAC. Since the inception of the project some 25 person years of long-term technical assistance have been provided under the contract, MIAC has also supplied 29 specialized short term technical consultancies as requested by ATIP and GOB field staff. At present there are 7 full time MIAC employees in the country. The ATIP project also supports the operation costs of two CRSP projects operating in Botswana, salaries of these US technicians are outside the MIAC contract. A complete listing of both long and short term MIAC supplied technical assistance follows on Chart No.

2. The evaluation team was impressed with the MIAC professional staff now at site. Few FSR projects have been afforded the opportunity to gather such a critical mass of scientific expertise. MIAC has correctly allowed the chief of party to manage the project from Botswana. MIAC support, through the lead institution Kansas State University, has been largely positive with minimal administrative interference or cross purpose dicta. ATIP team working relationships are positive, competitive, interactive and the resulting methodologies are on the leading edge of Farming Systems innovations in Africa.

The Government of Botswana is aware and supportive of the ATIP program. Regional Agricultural Officers expressed their hopes that ATIP activities could be broadened to encompass more villages, particularly in the Sand Veldt areas. Commodity research technicians at Sebele are looking for closer working relationships and joint on-farm research opportunities with ATIP field staff. Although there is presently one GOB T-4 vacancy on the project, national counterpart/colleagues assigned to the program are highly motivated and working as fully integrated members of ATIP FSR site research units. Job satisfaction on the part of MIAC employees was measured as high, average tenure in Botswana has exceeded two tours, or four years, which speaks highly of the KSU selection process and current field administrative procedures.

Few gaps have been encountered during the project in terms of untimely vacancies of MIAC positions. In two cases at Francistown where there was a TA staff change, an overlap of technicians took place allowing for smooth transition during staff rotation. Skill levels are more than adequate for the FSW required tasks, all members have had prior overseas experience many within Africa. The evaluators are concerned over lack of local language skills; increased competence could lead to better interpersonal relations and greater cultural sensitivities in TA team interaction with counterparts and regional MOA offices..

Representation of tenured staff from MIAC institutions on ATIP teams has been low. Only one of the present ATIP technicians, the team leader, is a tenured MIAC staff member. This phenomenon is not new to Title XII contractors working in FS programs. The state of the art of FS is new and in most

cases the brightest and most experienced candidates are found outside the university community. MIAC is to be congratulated for searching for quality and field experience. AID evaluators are hopeful that ATIP TA personnel might be absorbed into MIAC member universities at the completion of their Botswana assignments. To lose this opportunity and not take advantage of this valuable human resource would certainly bode poorly for the concept and history of AID strengthening grants, and title XII contractual associations.

The eventual strength of both the Francistown and Mahalapye teams depends upon the full staffing and integration of trained Botswana FS technicians into all phases of the ATIP research and extension activities. Agriculturally trained personnel are now returning to the project and are assuming leading roles on ATIP teams. GOB support in terms of housing and living allowance has not been adequate, and this problem may soon lead to the loss of this vital trained counterparts. MIAC, the MOA and AID/Botswana have been negligent in attending to the basic living requirements of the ATIP Botswana staff. To have supported advanced degree training of such a highly motivated group only to lose them because of lack of housing and other basic essentials, which were agreed upon in the project agreement between AID and the GOB, is ludicrous.

The chief of party has performed an outstanding service of conceptualization in this FS program as well as in others throughout the developing world. His present duties include many tasks best performed by other team members or by a competent administrative assistant. The situation is made worse by the fact that after four years of operations the COP still has not been assigned a GOB collegial working partner. The evaluators are critical of the lack of "quality COP time" available to other staff members. The majority of this highly qualified ATIP team had no prior FS experience and came to Botswana to contribute their individual skills to the development and refinement of an FS methodology that could become operative under the country's extreme climatic conditions. The perceived lack of sufficient on-going and meaningful interaction with the COP in this developmental process could result in second thoughts and dissatisfaction among the field staff.

### 3. Conclusions and Recommendations

MIAC has supplied an excellent group of technicians for the ATIP project. Few teams in Africa can surpass the quality of ATIP FS work performed to date. The current methodologies employed and under constant refinement are exemplary. The data and tracking systems are unsurpassed in FSR projects thus far reviewed by this evaluation team. However, critical issues still remain to be treated during the remaining LOP.

#### a. Recommendations:

- The proposed ATIP state of the arts FSW methodology guide for Botswana be completed before the termination of the present MIAC contract.

- Botswana technicians be trained in the operation of all phases of the data and management information systems.
- The COP block out sufficient "quality" time to meet and interact with his staff. His present 20% of time in the field, with much of this allocated to routine administration, does not make adequate use of his unique talents.
- Local language training continued to be made available through the project and staff members encouraged to participate.
- MIAC consider university posts for returning staff.
- Project funds be used to secure, construct, if necessary adequate housing for the Botswana staff, if GOB cannot live up to its commitments.
- GOB assign a full time counterpart to the COP, and the MIAC team employ additional administrative and data/word processing help to lessen the present overload on the COP.

Section IIF - Chart 1

Technical Assistance

A. ATIP Long Term Technicians

<u>Name</u>	<u>Position</u>	<u>Qualification</u>	<u>Station</u>	<u>Dates of Association</u>	
				<u>Start</u>	<u>End</u>
<u>I. MIAC Technicians</u>					
Hobbs, A.	Agronomist	Ph.D	Gaborone	Aug. 1982	Aug. 85
Norman, D.W.	Ag.Econ.	Ph.D.	Sebele	Aug. 1982	-
Siebert, JC.	Agronomist	Ph.D.	Mahalapye	Sept.1982	-
Baker, D.C.	Ag.Econ.	MS	Mahalapye	Oct. 1982	-
Heinrich, G.	Agronomist	Ph.D.	Francistown	Aug. 1983	-
Koch, B.	Animal Sci.	Ph.D.	Francistown	Aug. 1983	Aug.85
Miller, W.	Ag.Econ.	Ph.D.	Francistown	Aug. 1983	Aug.85
Trent, C.	Extension	Ph.D.	Gaborone	July 1985	-
Gray, R.	Animal Sci.	Ph.D.	Francistown	July 1985	-
Worman, F.	Ag.Econ.	Ph.D.	Francistown	July 1985	-

Short-Term Consultancies:(not a complete listing).

I. August 82 - September 83

Dr. J. Sjo - Agricultural Economist	9 Sep - 4 Oct
Dr. M. Collinson - FSR CIMMYT	17 - 20 Oct
Mr. C. Lightfoot - Agronomist	1 - 26 Nov
Dr. J. Jorns - KSU Administrator	30 Oct - 12 Nov
Dr.A. Barnaby - Agric. Economist	8 Mar - 1 May

II. August 83 - September 84

Dr. G. Ham - KSU Administrator	27 Mar - 12 April
Dr. R. Johnson - Extension	
Mr. S. Miller - Computer Science	1 May - 15 June
Dr. D. Rees - Soils	No cost assistance
Dr. J. Sinclair	No cost assistance

III. August 84 - September 85

Dr. J. McKinsey - MIAC Admin	March 1 - 5
Dr. R. McDowell - Animal Science	Nov - Dec
Dr. V. Withee - KSU INTSORMIL	Jan (no cost)
Dr. E. Kanemasu - KSU INTSORMIL	Jan (no cost)
Dr. R. van der Lip - KSU INTSORMIL	Jan (no cost)
Dr. A. Biere - KSU INTSORMIL	Jan (XII SGRMT)
Mrs. S. Miller - Marketing	April 85
Dr. B. Schurle, Agric. Econ.	July 85
Dr. Guthrie - SMSS	Sept. 85
Dr. M. Clegg - INTSORMIL	85

IV. August 85 - June 86

K. Conniff - CRSP	
D. Burk -CRSP	
Dr. A. Hansen, Anthropologist	June 86
Dr. D. Mays - SMSS	
Dr. H. Eswaren, SMSS	
Dr. C. Francis - MIAC	June 86
Dr. A. Price - SMSS	
Dr. Godvory - INTSORMIL	85/86
Dr.D. Andrews - INTSORMIL	85/86

## II.G. TRAINING

### 1. Long-Term Training

The types of training that are provided under ATIP according to the PP include long-term, short-term and on the job training. The PP, however, overlooked the role that inservice training could perform.

It appears that the Project will meet its commitment of training counterparts to BS and MS levels. By the end of 1989, 13 local counterparts will have completed University training (7 with BS in agronomy, Agricultural Economics, seed technology or rural sociology; 6 with MS in agronomy, agricultural economics, animal science). Of the 13 trainees, four have completed their degree courses (2 BS and 2 MS) and are now placed in the Department of Agricultural Research (DAR), and Division of Planning and Statistics (DPS), in some cases working directly with the project. Eight are currently pursuing their degree courses, one is scheduled to leave in August, 1986 and the last two are expected to leave early in 1988. Because of the critical shortage of trained local manpower in ATIP and in DAR in particular, the 1984 mid-term Evaluation in concurrence with the ATIP staff, supported and endorsed the idea that additional funds be sought FOR supporting long-term training with an additional 19 person years during the current contract period. GOB, however, seems to have lagged behind in assigning funds for long-term training, despite their commitment to fund a total of 12 - 15 person years.

### 2. Short Term Training

Since the introduction of ATIP, a number of project staff and other officers from DAR, DAFS and DPS have been sent out for various short-term training courses ranging from one week to six months. During 1984/85 a total of 31 officers with varied and different levels of academic training have participated and benefitted from short-term training financed under ATIP. These courses have included a six week USDA course in USA, involving vegetable production and marketing, an agronomy course in Malawi organized by CIMMYT, and another course organised by ICRISAT in India.

### 3. Inservice Training Courses

During 1984 the Food and Feed Grain Institute of Kansas State University held an inservice training course attended by 18 participants from DAFS, Botswana Agricultural Marketing Board (BAMB), and the World Food Programme. This course led to the introduction of the Extension Programme on improved grain storage techniques which has long been a standing problem of grain loss caused by poor on farm storage facilities. Ten officers received training on Apple IIe micro-computers which helped to introduce the concept and build a capacity for indigenous officers to use micro-computers.

The need to improve, promote and strengthen inservice training, particularly for DAFS, cannot be overemphasized since they depend to a large extent on inservice training to help improve and upgrade AD performance. It appears that inservice

training activities particularly for subject matter specialists are not held regularly nor do they prove effective. Since most of the subject specialists are in fact not trained in specific areas per se, but are general agriculturalists, more and regular short-term training in their respective discipline areas would prove more effective. One advantage of inservice training is that more officers are able to participate and benefit, and each activity can be adapted to suit the academic level of the participants and can also be related to the situation and needs of the participants.

4. On the Job Training

In the apparent absence of FS in the existing training and educational institutions (i.e. the University and BAC), it would appear that on the job training within the existing farming systems projects will continue for some time to be the main and only way of introducing and sensitizing extension personnel to FS concepts and to this broad approach in extension and research as a strategy to development.

5. MOA's Research, Extension and DPS Training Priorities.

It appears that within GOB the focus on training first went to localizing expatriate posts, followed by providing DAR with the necessary indigenous trained manpower required to undertake research work, and lastly training indigenous personnel necessary to run the Veterinary Department. The DPS division followed the above Departments in acquiring degree training. This meant that DAFS depended more on short-term training programs for upgrading and improving mid level extension staff. Besides, new projects emerged, i.e. the Plant Protection Unit which requires specialized training and those emergency programs seem to take priority over existing training schedules.

The training objectives of DAR are to train national scientists so that the department can build a long-term capacity to undertake agricultural research as directed by the Botswana Government. Now that DAR seems to have acquired some national scientists, even though numbers are still inadequate, a shift or change to include BS training and specialized short-term training for Field Services could help raise the level of competency of extension staff so as to compare favorably with the DAR counterparts.

6. Retention of Graduates

Graduates who have completed training financed by ATIP have been placed with the project, or otherwise with DAR, DPS and DAFS. In general it appears that there is a gradual exodus of other graduates from the Ministry to join the private sector and parastatal organizations in search of better paying positions.

The Government of Botswana realizes that in order to meet the goals and objectives outlined in the National Development Plan VI, she requires trained people with appropriate skills and techniques to undertake those responsibilities. Government alone would be unable to shoulder this training responsibility and USAID has responded positively through projects like ATIP in providing some of the much required training needs. It is

hoped and expected that this type of assistance will be continued.

7. BAC Role in FSR

One of the recommendations in the 1984 midterm evaluation was that a course on FS be incorporated into the BAC curriculum. This has not materialized. It is hoped that the RECU will follow up through the newly established Ministry Training Committee, and directly with the BAC principal. One of the Botswana scientists presently working with FSR teams could be incorporated into the BAC training staff. In addition, technicians from the several FS projects in Botswana could be invited to give lectures at the BAC. The RECU would be responsible in identifying appropriate classroom teaching materials and audio visual aids through FSSP and elsewhere. ATIP and other FS project members could serve as guest lecturers.

8. MOA's Plan for Degree Training

It appears that there is presently no coordinated long-term training program for degree training in the MOA. However, each Division/Department prepares its own training program which is prioritized according to its own needs and is sent through the Training Officer to the Directorate of Personnel for consideration.

9. Conclusions

- a. Ministry of Agriculture should develop a plan for long-term and short-term training particularly for DAFS, DPS and DAR, the team encourages USAID to seek additional funds for supporting training.
- b. BAC should incorporate training in Farming Systems work into the curriculum.
- c. ATIP and divisions within the MOA should make better use of inservice training to expand staff capabilities in a cost effective way.
- d. Short-term training opportunities should be identified for MOA staff and support be identified for this activity.
- e. Serious attention needs to be given by the GOB to retention of graduates, and every effort made to meet their housing, work transportation and other program needs.
- f. Copies of ATIP annual reports should be sent to students in long-term training. In addition, a one or two-week workshop should be organized for them to help link their course work with the Botswana situation and what might be expected of them on their return. One of the organizers planning the workshop should be a member of the ATIP staff who will update students on most recent findings from the project.

### III. PROJECT MANAGEMENT

#### A. Chief of Party

ATIP has had the leadership of not only an able administrator, but also his input in the conceptualization, development and implementation of an FS methodology suited for the harsh conditions of Botswana. The evolution of this approach is still quite dynamic and builds on the results of each survey and experiment. The Project Paper calls for the COP to contribute to the total research efforts of the program; there is ample evidence of this significant contribution throughout the project. Lessons learned during the first four years of this research and extension effort have called for several approaches to FSW in order to identify or delineate those methodologies that will function best under fluctuating patterns of low rainfall. This search for options in FSW applications, as well as for improved technologies is still under way, for their two assigned work areas. In addition to research leadership, the COP has undertaken the majority of all tasks associated with project management. It appears to this evaluation team, as it did to the group in 1984, that ATIP should provide qualified administrative and computer help to the COP for the project. With only eighteen months left to complete many of the called for outputs of this contract, the COP will be required to spend much more interactive time with his field staff. The assignment of a qualified counterpart would also help to share the management tasks now being performed by a highly qualified, but over burdened scientist.

#### B. MIAC Support

Kansas State University, the lead MIAC university for this contract, has assisted the goals of the ATIP by making special arrangements to take Botswana candidates into their degree programs. They have also contributed to long-term training by providing two special scholarships and part-time assistantships. Tuition fee waivers were arranged for these students as well. Title XII strengthening grant funds were used to support ATIP-related visits by MIAC faculty. Long-term trainees are located at several of the MIAC universities.

A major role MIAC could play in the developmental processes of Africa would be to assimilate some of the present non-tenured staff working on their ATIP contracts into member institutions. Several of these researchers will require additional time after completion of their tours in Botswana to complete research activities, analyze data and summarize FSR lessons learned for publication. This will help Botswana, as well as bring credit to MIAC and to KSU. It is recommended that MIAC explore the means to facilitate re-entry and support this activity, either with strengthening grant, overhead, or other university resources.

Also MIAC could perform a better job of sending ATIP documents to ATIP-financed students. To date there have been deficiencies in doing this. As part of the linkage function

with students, MIAC should take responsibility in helping students relate their course work to the job they are expected to fulfill in Botswana and Botswana conditions (see recommendations in training section).

C. AID/Botswana

Relationships between the contractor and AID offices appear to have been good. Few projects have been as well documented as ATIP, and preparation for this review exercise is but one example. Project records were in order and financial statements current. However, AID management and monitoring procedures of the ATIP project seem to the review team to be overly complicated. Many of the requirements for use of Project Research and Operational Funds held by AID/Botswana seem unnecessarily cumbersome. Lack of project funds to provide travel and per diem for ATIP professional staff to attend regional or international seminars and workshops is a critical constraint to professional growth and project progress. Difficulties over interpretation in the use of funds for short-term training/conferences have also been encountered; this budget line items should include seminars and workshops.

AID was not aware of and had not acted upon the housing problems faced by the national research staff assigned to ATIP. No housing has been provided for Botswana technicians, although all MIAC staff are comfortably housed. Unfortunately, this two tier system will have lasting effects on any new AID efforts as well as those of the current ATIP program.

The unmet covenant requirement of a national research strategy has seriously hindered institutionalization of a national FSR methodology, although a planned Agricultural Sector Assessment may eventually lead to this formal strategy.

D. Conclusions and Recommendations

ATIP has made a contribution to research activities in Botswana by emphasizing the FS approach and developing systems research strategies for work in difficult environments. Training has proceeded in a timely manner and has been well received by the GOB. GOB contributions according to AID/Botswana have exceeded the required 25%. However, critical basic comforts and support systems have not been provided to ATIP national staff. AID has been very supportive of the project, although its management mode and funding for specific line items could be improved. The possibilities that the proposal for a national FS strategy being implemented during this contract are slim. The possibility to build strong linkages and improve interactions between the ATIP teams and local extension specialists and agents during the present contract should become a prime concern of all staff during the LOP. ATIP progress should be measured in grand part on this local linkage issue during the next 18 months.

Recommendations of the evaluation team are:

- More than one strategy for institutionalization of FS activities needs to be developed; of prime importance during the next 18 months would be a regional approach rather than full scale institutionalization at the national level.
- The Chief of Party should hire an administrative and computer help to assure that he can spend more "quality" time with the field staff. Perhaps a one week retreat for the entire team several times during the LOP could help to promote more in-depth communication.
- The CIMMYT East Africa OFR/FSP Regional Program could collaborate with ATIP in developing a special course/retreat for top ministry administration to improve their understanding of FS and its successes. Field visits might be made to other East Africa FS programs.
- MIAC should assist ATIP staff in job placements within the university consortium and provide opportunities to do additional analysis and write-up activities after completion of assignments in Botswana.
- AID/Botswana should work with the GOB address the urgent housing problem for Botswana at both Francistown and Mahalapye.
- Consideration should be given by AID to funding at least one professional trip every two years for all ATIP professional staff, including Botswana.

IV. FINANCIAL MANAGEMENT AND CONTROL

A. AID Financial Records

The evaluation team found accurate financial records in the Controller's office. The records contain information on disbursements, commitments, and obligations which are updated on a monthly basis. Estimated accrued expenditures are updated on a quarterly basis. The records give information for the following items: MIAC contract, other technical assistance, participant training, and GOB operations and support.

One of the reasons for the timelines and accuracy of this information is the lack of a Federal Reserve Letter of Credit (FRLC) facility in the MIAC contract. Since MIAC does not receive advances, they are compelled to submit vouchers on a timely basis in order to be reimbursed.

B. GOB Contributions to the Project

USAID estimates the GOB's contributions in support of ATIP for the period from the project's inception through December 31, 1985 to be the equivalent of \$1.04 million. Their contribution included salaries for Botswana project staff, furnished housing for project staff, vehicles, office space, and travel for training participants. Since USAID accrued expenditures as of December 31, 1985 were \$2.9 million, the GOB appears to be providing more than 25 percent of total project costs to date.

The best source of information needed to make these estimates is the contractor's annual report. It is USAID/Botswana's intention to update these estimates annually after receipt of the report (usually in October each year). Since doing these estimates is a time-consuming exercise, the Mission does not believe that more frequent updates would be cost effective. The evaluation team concurs in this approach. (See Gaborone 1226, dated 4/10/86)

While the GOB's total contribution to the project appears to be adequate, housing for Botswana project staff at present seems to be sorely lacking. The evaluation team found that the GOB had not provided housing for a single counterpart in Mahalapye or Francistown. This has created a severe morale problem and compromises the counterpart's long-term ability to continue with the project.

C. Financial Management Issues

1. A local currency account controlled by the project receives advances from the USAID/Botswana Controller's office. Further advances are not made until vouchers are submitted giving evidence of allowable expenditure of advanced funds. The evaluation team found that since research and operations vouchers are submitted late by GOB, the project does not, in turn, receive further advances in a timely manner.

2. A greater understanding needs to be reached on what local currency expenditures are allowable and what documentation needs to accompany their submission to USAID/Botswana. For example, funds used for food and refreshments for field demonstration days require prior approval from USAID. Also, vouchers for such expenditures must contain information describing the use of the funds, such as numbers of individuals involved, location and description of event. An annual plan of expenditures agreed upon in advance by the contractor and the Controller's office could facilitate this process.
3. The MIAC teams in Mahalapye and Francistown pay logistical and housing expenses from a revolving fund supported by the Controller's office. The evaluation team learned that the teams felt that the fund was not adequately funded. If this is indeed an item for action, the MIAC team should suggest an increase of the revolving fund to the Controller's office.
4. The MIAC teams in Mahalapye and Francistown have found AID regulations concerning home leave and R & R and the allowable cost of airline tickets to be confusing. They reported that being in the field without easy access to advice from USAID compounded their problem. Written guidelines covering these subjects could help address this issue.
5. The AID support unit has made major improvements in assistance to the ATIP project since the last evaluation; the unit should be encouraged to undertake more of the GOB voucher and reimbursement processes.

## V. LESSONS LEARNED

### 1. Adoption of Recommended Agricultural Technology

Farmer surveys have revealed that few of the currently recommended practices from experiment stations are being widely used by small farmers. There have been years of research leading to recommendations on quality plowing, precision planting, lower plant densities, and improved varieties. Of these, only the improved sorghum variety Segaolane appears to be widely accepted -- in part because seed is distributed gratis each year. The lesson is that on-station research may not lead to widely understood and adopted practices unless the new technology is appropriate to solve perceived constraints, helps meet the goals of the farmer, and does not introduce an inordinate cost or risk, and is properly disseminated to farmers through an effective extension program.

### 2. Importance of On-Farm Research

To learn which practices will be understood and adopted by farmers, and to add more credibility through additional testing locations, it is highly desirable to expand the research agenda from reliance only on station experiments to a system of tests with farmers. This is an important lesson in resource-poor regions with great yearly and locational variation. An efficient system could substitute more locations in one or two years for many year's research, and allow a researcher to reach valid conclusions more quickly.

### 3. Production Strategies for Harsh Conditions

An important lesson from the ATIP is that recommended components or packages of technology are seldom consistent in their performance in this difficult soil/rainfall situation. A more appropriate strategy is the contingency plan which indicates certain practices when a set of conditions occur; this is followed by other practices as appropriate. The procedure could be called a decision tree, or linear model of alternatives. In reality, this approach builds on current farmer systems, and allows the technical scientist to infuse specific practices only when there is high probability for success.

### 4. Potential Isolation of Research Activities

The successful surveys and field experiments of the ATIP illustrate how a project can achieve some of the stated goals of the project with minimal participation from national agencies operating in the same region. Although at times it is more efficient to use project resources and people to do things quickly and effectively, the chance may be lost to train others to do those activities in the future. It would be highly desirable to incorporate people from the extension and research groups in the MOA into more of the field activities, plowing, and interpretations of results, as a step toward institutionalization of activities at the local and national levels.

#### 5. Importance of Team Approach to Research/Extension

The complexities of production constraints and difficulties in overcoming them through use of technology in the project areas underline the importance of FSW team interaction with both research and extension. When problems include such diverse factors as limited moisture, appropriate tillage techniques, drought tolerant varieties, lack of draft for plowing, multiple crop and animal enterprises in each family, and high risk in the total environment -- it is close to impossible for one or two specialist to understand and deal with this complexity. The team approach to research and extension holds promise for solving these complex problems, and the involvement of local people and institutions in this process are essential.

#### 6. Inputs of Social Scientists in FS Teams

The ability of economists on FS teams to take into account gender issues and cover endogenous factors which influence willingness and ability to adopt new technologies can vary significantly depending on the academic background, interest, and sensitivity of the individual. Greater care needs to be given in FSW to ensure that a sociological input is built into the team activities by including an economist with academic preparation in rural sociology/anthropology, and with periodic input from a rural sociologist/anthropologist on methodological and other issues. Another model would be to have the rural sociologist/anthropologist work full time with the FSW teams during the crucial initial years, as well as in the important stages of interpreting feedback from farmers in surveys and agronomic trials.

#### 7. Understanding the Farming Systems Approach

Understanding the farming systems approach in identification of research priorities and the potential benefits of this approach to client farmers has not taken place at higher management levels of the MOA. This is reflected in the field by an absence of active participation by MOA staff. This might have been prevented by tighter project design, including as a condition precedent formal working agreements between extension and research units signed prior to first disbursement. A more rigorous use of regional FSR training programs, such as those in Zimbabwe, attendance of APOs and key researchers in FSR workshops, and more intensive use of seminars and short courses could be a practical step in overcoming this problem. Special training programs for ADs at the ATIP sites, and use of these agents in the early survey work might have assumed their later participation in FSW. Project funds should be assigned during the remainder of the LOP to accommodate these needs.

#### 8. Interaction with Commodity Research Specialists

The close interaction desired between commodity research groups and FSR teams has not taken place as planned in the ATIP project. This lack of close collaboration between on-station scientists and the FSW field teams may also partially explain

the lack of understanding and appreciation of Farming Systems Work at the National level. One first step to overcome this barrier is to convince all researchers of the value of on-farm research. Project resources might have been well spent by sending a number of Batswana to IARCs for intensive crop production courses, especially in those centers which include a FS perspective in their commodity research.

#### 9. Linkages between Research and Extension

During the first four years of the project the work of the RELO has not produced sufficient meaningful linkage mechanisms at the national level or at the two ATIP sites between FSW teams and extension agents or between these teams and commodity research groups at Sebele. Perhaps a strategy of placing the RELO at Francistown or Mahalapye for an intensive effort toward integration at the field level would have offered more to show than is apparent in the current project. The approach has worked well in other countries where the entire field team has interaction, extension linkage has high priority, and the RELO has the time to lead and direct this strategy.

VI. EXPANDED LIST OF RECOMMENDATIONS

A. GOB Support to Project

1. The GOB should supply housing to all professional Batswana technicians assigned to the ATIP project.

B. Concept of FSR

1. ATIP should better articulate FSR methodology to decision makers in the GOB in order to encourage more DAFS involvement in the site specific FSR and promote better interaction with on-station researchers. The CIMMYT East Africa Regional Farming Systems Project should be requested to collaborate in this articulation effort by organizing a study tour and short course, if ATIP and the MOA agree such an intervention would be beneficial to better understanding FS.

2. An audiovisual approach should be implemented to publicize and describe FS and its components, and how it is addressing production problems and constraints in rural Botswana.

C. FSR Institutionalization

1. Consideration should be given to moving one or two members of the ATIP FS teams to Sebele, in order to effectively backstop Batswana teams in the project regions.

2. The GOB should assign a Motswana as counterpart to the ATIP COP.

3. Before termination of the present MIAC contract, ATIP should complete one or more "state-of-the-art" guides on FS methodology developed for the harsh and uncertain climatic conditions in Botswana.

4. Professional members of the RSU of the DPS should participate in some of the critical intervention points of ATIP activities to enhance the capacity of Batswana to carry out FSW.

5. Alternative strategies for institutionalizing FS should be developed; of prime importance during the next 18 months would be suggestions for a regional approach and gaining better MOA recognition and acceptance of FS as an important part of both research and extension, rather than "full scale" institutionalization at the national level.

6. The current placement of the RECU in the office of the Chief Crop Production Officer should be examined; assigning this function higher in the MOA would allow the RECU more authority and opportunity to liaise with other field service offers, research divisions and planning.

D. ATIP

1. The Chief of Party should spend more "quality time" with the field staff. Perhaps a one week retreat for the entire team several times during the LOP could help to promote more in-depth communication and interchange of ideas on the FS approach and methodology in Botswana..
2. Given the uniqueness of approaches used by each ATIP regional team and other FS teams, there is a continuing need for COP professional input in the interpretation in the FS process in each ATIP region and in the development of a state-of-the-art guide on FSW.
3. MIAC should employ additional administrative and computer assistance to lessen the present heavy workload on the COP.
4. The recognition of how farmers deal with risk in a marginal cropping environment, through cropping and livestock strategies and some empirical contingency decisions, has caused the team to consider new technologies and ways to describe how low-resource farming might be more successful. This approach should be pursued, and may have great promise for reducing risk and improving production under difficult conditions.
5. MIAC should assist long-term ATIP staff in job placements and tenure within the university consortium and provide opportunities to do additional analysis and write-up activities after completion of assignments in Botswana.
6. An attempt should again be made to make local language training available under the project. Staff members should be encouraged to participate.

D. FSR Contribution to Policy and Planning

1. ATIP should use the established channels of communication within MOA so that important field data and FSR findings can be included in the policy and planning processes.

E. FSR Clients

1. As a part of the upcoming Agricultural Sector Assessment, GOB should consider if FS should also be given emphasis in more commercially viable farming areas.

F. Training

1. Priority should be given to using remaining ATIP long-term training funds (the GOB funding for 15 person years) for training DAFS professional and subject matter specialist staff. Training in the FS approach to extension should be part of all training programs. If FS is not part of formal course work, Botswana technicians and students should be provided the opportunity to attend FS short courses, workshops and conferences.

2. Training made available by the GOB and AID under the ATIP project (especially for the DAFS) should include an FS perspective for the purpose of promoting the FS approach to research and extension.
3. The MOA should develop a plan for long-term and short-term training, particularly for DAFS, DPS and DAR. USAID should explore additional ways for supporting the training plan. MIAC should investigate means of supplementing current ATIP funding of Batswana for long-term training.
4. Crop and animal production officers should be sent for specialized production short courses (four to nine months) offered by the International Agricultural Research Centers.
5. More effort should be made by ATIP to provide short-term orientation and in-service training in FSW to high and mid-level administrators of the MOA. Study tours should be arranged for them to visit FS projects in other countries where FS is playing a major role in extension, research, and planning.
6. Professional members of the RSU should be sent to short-term courses, seminars/conferences and workshops on FSW. On the job training should be provided by ATIP to RSU through short-term consultant services of a rural sociologist/anthropologist.
7. BAC should incorporate FSW training into its curriculum.
8. The DAFS National Training Coordination Committee should consider and act on the inservice training recommendations of the 1984 R.L. Johnson consultant report.
9. Inservice training programs should be developed, for ADs and other regional and district extension staff, in FSW as well as in critical technical subjects.
10. Serious attention should be given by the GOB to retention of DAR, DPS, and DAFS staff, particularly degree graduates. Every effort should be made to meet their housing, work, transportation and other project needs.
11. It is essential that funding be continued for the three Batswana currently in cowpea CRSP long-term study programs.
12. Given the importance of a continuous and sufficient supply of quality seed, training should continue for SMU non-professional personnel such as field technicians and seed plant operators who can assume the day to day operation of the plant, the seed testing laboratory, and field inspections.
13. ATIP Batswana technicians should be trained in the operations of all phases of the data and information management systems.

14. MIAC should improve linkages between its trainees in the US and ATIP Botswana operations.

G. Research-Extension Linkages in FSW

1. Given the variability of crop response to current agricultural recommendations, more attention should be given by the ATIP FS teams to closer collaboration with the national research team to test under local conditions, the technologies shown feasible in on-station research. There is a critical need for on-farm testing in a number of locations to determine the relevance of each component of technology. Although the resources of ATIP are limited, much credibility would be gained by a closer working relationship with station researchers and a greater willingness to test new recommendations from the central research staff.

2. The responsibility for establishing effective linkage relationships between research and extension should rest with everyone on the ATIP, not just the RELO. Technicians on the teams should more actively pursue good working relationships--formal and informal--with DAFS staff at the regional, district and AD levels. ATIP field team members and the RELO should attend meetings in the districts and regions and in DAFS and DAR in order to better understand the problems of each group and attempt to improve linkages. The ATIP teams also need to work collaboratively with DAFS staff in the project districts and regions.

3. Funds should be allocated for secretarial services and purchasing binders to complete the work initiated two years ago in updating the AGRIFACTS circulars and Agricultural Extension Handbook, priority should be given to their rapid clearance and publication.

4. The RECU should ensure that extension information include details on where recommendations can be used and the conditions under which they are likely to be successful. Greater attention should be given to additional use of radio and other mass-media systems and techniques for extending agricultural production information and recommendation in rural areas.

5. Arrangements should be made to ensure that one or more qualified Botswana (with a FS perspective) be assigned to the RECU while the present officer is away on long-term training.

6. The RECU should give more emphasis to local integration of work between extension and research officers at ATIP sites, including the work of the ATIP team.

H. INTSORMIL

INTSORMIL research should be designed to complement other research activities already in progress at the central station, should incorporate an active on-farm dimension into the total research effort, and should be responsive to key national research priorities as determined in consultation with Botswana

researchers and the Director of Research. There is a critical role for both long-term and short-term TA staff to work with national sorghum-millet improvement program technicians in setting priorities and planning trials in breeding and agronomy. There has been excellent interaction with a short-term TA plant breeder, and this type of field consultation should be pursued in other areas.

#### I. Financial Management

1. An agreement is needed among USAID, ATIP and the GOB's MOA and Ministry of Finance and Development Planning on what local currency expenditures are allowable and what documentation is required by USAID. An annual plan of estimated expenditures (agreed upon in advance by ATIP, the Ministry of Finance and Development Planning, and the USAID Project Manager) could facilitate this process.

2. The GOB should submit vouchers for expenditures incurred from the local currency account in a timely manner so their reimbursement can be made. Vouchers should be sent through the USAID Project Manager, so that he can also advise on any likely problems.

3. If the revolving fund to cover logistics and housing expenses of the MIAC teams in Mahalapye and Francistown is not adequately funded, the MIAC team should submit a written request (to the USAID Controller's Office through the USAID Project Manager) for an increase of funds in the revolving account.

4. The USAID Controller's Office and Project Manager should provide written guidelines to MIAC on AID regulations concerning home leave and R&R.

5. USAID support needs to be expanded to cover the participation of ATIP professional staff, including Batswana, in regional and international seminars and workshops. Each professional member should be permitted to make one professional international trip every two years.

6. The USAID Project Manager for the ATIP project should be the primary contact between the MIAC ATIP team (usually the COP) and the USAID Mission on all project matters.

EXTERNAL EVALUATION OF AGRICULTURAL  
TECHNOLOGY IMPROVEMENT PROJECT (633-0221)  
May 27 - June 13, 1986

Overall Purpose:

The project has now had 4 years of field experience in Mahalapye and 3 years in Francistown. With next year being the final year for field research under present funding, this second major external evaluation needs to focus on whether the project should be continued, and if so how the transition might be made. Emphasis needs to be placed on progress being made towards institutionalization of the FSR approach in Botswana, the research results obtained to date and the prospects for favorable outcomes in future. Consideration needs to be given to the project's entire history occurring during drought years, and an assessment should be made of the replicability of findings to years of higher rainfall.

The current Project documentation and proposed reprogramming documents, especially the revised Log Frame will be used to structure the evaluation format. The overall project success in meeting its objectives must be measured.

By the time of the Evaluation the Mission will have developed proposed revisions to several basic documents which should be reviewed and comments provided in view of the evaluation findings. These include: the log frame, PP amendment and PROAG.

SCOPES OF WORK

General Considerations for Team Members as Appropriate

- A. Review relevant background documentation.
- B. Assess the quantity and quality of technical assistance provided by the Project contractor in terms of:
  1. Professional staff research qualification (i.e. education, experience, relevant publications), and amount of staff turnover.
  2. Ability of conduct research under local conditions.
  3. Ability to work with and develop skills of Batswana counterparts.
  4. Ability of the two teams to conduct interdisciplinary research.
  5. Assess the support given to the Project by the GOB and USAID.

- C. Evaluate the progress made by the project in the following areas:
1. Institutionalizing the FSR approach with special attention to the staffing pattern and training plans of the DAR, DAFS and the overall Ministry of Agriculture.
  2. Improving the capacity of the Department of Agricultural Research to develop appropriate technologies.
  3. Improving the capacity of the Field Service Department to transfer technologies.
  4. Strengthening and institutionalizing the linkages between 1 and 2 above.
- D. Assess balance of emphasis under the project given to cropping and livestock systems.
- E. Assess the adequacy and appropriateness of training being provided to Botswana students, and evaluate the training given to returned participants. Comment on future training plans.
- F. Evaluate the project against current project documentation and proposed revisions and measure progress against the benchmarks.

#### Agricultural Economist

- A. Review relevant background documentation.
- B. Assess the adequacy with which the project has:
1. Identified problems and opportunities in the context of the Botswana farmers' situation.
  2. Developed a research base, including collecting, assembling and managing data.
  3. Evaluate the extent to which the data can be disaggregated to measure project impact as well as identifying recommendation domains.
- C. Review the planning and implementation of on-farm research and its analysis.
- D. Assess the degree to which the project can be expected to produce results relevant to small farmers.
- E. Assess the degree to which the project activities are consistent with National Policy goals as articulated in NDP VI.
- F. Review agricultural policy implications of Project and recommend future actions of project with respect to this area.

Social Scientist

- A. Review relevant background documentation.
- B. Assist the Agricultural Economist as required on Items B to F above.
- C. Review the GOB inputs in the provision of social science technical assistance and training and suggest changes if required.
- D. Assess the adequacy with which the project has assessed the endogenous aspects, particularly the household labor force, cropping choices, livestock access and off-farm employment.
- E. Review the degree to which the teams function as interdisciplinary units.
- F. Review the adequacy with which team members are training and supervising interviewers.

Agronomist

- A. Review relevant background documentation.
- B. Assess the target and research area selection process for crops, with emphasis on appropriate problem identification and potential for finding solutions.
- C. Review data collection forms and field designs for experiments.
- D. Assess the degree to which knowledge of soil characteristics constitutes a barrier to improved crop practices. Recommend changes in amount of soil work undertaken by project if required.

Animal Scientist

- A. Review relevant background documentation.
- B. Assess the selection of research areas and possible interventions related to livestock with respect to their potential benefits.
- C. Review data collection forms and assess adequacy of sampling and field data collection.

Agricultural Development Officer (USAID/Botswana)

- A. Assist in providing background information of project.
- B. Assist in providing access to related agricultural information sources.
- C. Act in a liaison and consultative role to all team members.
- D. Accompany on selected field trips.

Project Development Officer (USAID/Botswana)

- A. Review financial, administrative and management aspects of project implementation, and make recommendations accordingly. Suggest any project budget changes required by the above.

Update March 10, 1986

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## ANNEX B

## I. SUMMARY 1984 EXTERNAL EVALUATION

The evaluation team found the project to be exceptional in terms of design and implementation. Its complex, though efficient organization is focused on the challenge of implementing a farming systems approach to research, stimulating linkages between experiment station and on-farm research, and catalyzing the communication between research workers in DAR and extension personnel in DAFS. Despite the drought, the evaluation team estimated that most activities in the project were on track in concept and timing. The project has set in motion an approach to agricultural development that will benefit the limited-resource farm family in the harsh and unpredictable environment of Botswana, and has begun the process of institutionalizing this approach. Significant progress toward project goals can be expected by the end of the current contract. In terms of the substantive goals of improving technology that result in increases in small farm production, exogenous conditions have prevented the project from producing measurable, reliable results.

The mid-term evaluation assessed the organization and team approach followed in the ATIP to address problems of the small farmer. The evaluation team identified a number of specific procedural questions which should be resolved for more efficient project implementation, as well as a series of larger conceptual issues which are critical to long-term success and institutionalization of the farming systems approach to development. These have been discussed with GOB and USAID/B personnel and detailed in Section III. This evaluation also addresses the policy issues which should be assessed as a result of the research findings of this type of FSR project.

The GOB was congratulated for their participation in the planning and implementation of this project. USAID/B had provided valuable administrative and support services facilitating the efficient operation of the project. The contract team had done a superb job in a short time to organize and implement an exemplary program and to summarize and report their results in a timely manner.

## II. INSPECTOR GENERAL AUDIT OF BOTSWANA AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT December 1985

The Office of the Regional Inspector General Audit/Nairobi concluded that project objectives were consistent with and supported self-sufficiency in basic grains and legumes, raising small holder incomes, creating employment in rural areas, and slowing rural to urban migration. Most of GOB's efforts in agriculture to date were concentrated on the highly remunerative livestock subsector. However, there became an awareness of the limitations of livestock production as a source of employment and income for the rural poor and the GOB has since placed considerably more emphasis on increasing arable crop production through ALDEP and ARAP programs..

In addition, RIG noted that the project had made only limited progress towards meeting stated goals and objectives and that some slippage in implementation had occurred primarily in the testing, development and dissemination of new technologies and technological packages. They noted nothing in their review that indicated AID-provided resources were not being used as planned and in conformance with applicable laws, agency regulations and the project agreement or that project resources were not being used in the most economical and effective manner. Throughout the review nothing came to RIG attention which indicated non-compliance with those pertinent sections of the FAA.

The project had encountered significant problems in achieving its purpose. The purpose of the project was to improve and expand the capacity of the Ministry of Agriculture (MOA) to perform research and convey the results of that research to the small farmer and to provide adequate supplies of quality seed to all farmers. At the time of the review, with the exception of testing of some new technologies including on-farm trials and training of long-term participants, few desired outputs of the project had been met. RIG found that the inability to achieve the purpose was due primarily to faulty assumptions in the project's design and a three-year drought which coincided with project implementation. Further, the GOB had not developed a research strategy to guide research efforts. Also, the vast majority of the funds originally programmed for the seed production unit were no longer needed. In addition, they found that GOB contributions to the project were not documented and neither the GOB nor USAID/Botswana knew the value of those contributions which had been made. Finally, it was noted that excess dollars programmed for local currency expenditures had accumulated because of an appreciation of the U.S. dollar over local currency.

RIG/A/N recommended that USAID/Botswana take various actions to correct the cited deficiencies, and recommended that USAID/Botswana make revisions deemed necessary to enhance the project's chances for success, ensure the GOB develops a research strategy, reprogram unused funds originally allocated for a seed production unit, develop and implement procedures to monitor agreed-to GOB contributions, and deobligate or reprogram as necessary excess dollars accumulating from the appreciation of the U.S. dollar over local currency.

### III. STATUS REPORT OF THE PROGRESS MADE BY ATIP SINCE THE 1984 EXTERNAL EVALUATION

#### 1. Finding, 1984

The current number of Batswana scheduled for long-term training and their levels of training are not sufficient to effect the institutionalization of the farming systems approach to development.

Recommendations

- A. A training schedule be developed that includes the time period of training, the number of individuals involved, the degrees sought, and the positions which may be assumed at the end of training. the training plan should be designed to double the potential for training related to FSR projects in the MOA central staff, DAFS field staff, and DAR research backstopping.
- B. Intensify the effort of training Batswana in B.S. and M.Sc. (and Ph.D. level only when necessary and appropriate), so that trained personnel will be available to work in the ATIP to continue its approach to research and the linkages of research and extension when the project is terminated.

Status, 1986: A concentrated effort has been made to identify qualified Batswana for long-term training. The project has developed a training plan and schedule, and this has been implemented. The training funds from within the project have all been committed, with the last of the Batswana scheduled to leave in August 1986. Two individuals have returned from the U.S. with M.S. degrees and were assigned to the project teams.

2. Finding, 1984

The current five year time frame of the ATIP is part of a longer USAID/B and GOB plan which should allow for institutionalization of a farming systems approach to research in Botswana.

Recommendation

At least two years prior to the PACD (Project Assistance Completion Date), consideration should be given to the extension of the project.

Status 1986: Extension of the project has already been approved to September, 1989; an amendment to the project to extend further to September, 1990 is ready to submit to the government of Botswana. This reflects the appreciation by USAID/Botswana and the contractor that development is a long-term process, and that FSW can be central to the long-term objectives of Botswana. A no cost extension of the MIAC contract has been made until December 1987.

3. Finding, 1984

There is a need for more specialized social science input to the ATIP that the GOB is currently unable to provide.

Recommendation

- A. A short term consultant be assigned a series of three to five month research/training consultancies with ATIP and the Rural Sociology Unit.

- B. Degree level training be provided for Batswana under ATIP auspices.
- C. TDY of the ATIP staff include time for interactions with FSR-experienced anthropologists and sociologists.

Status 1986: The need for continuing input from social sciences is recognized by the ATIP team. The recommended consultant has not been contracted, but (insert number) Batswana have been identified and sent for long-term training in this area. There is currently a young social scientist from the DPS assigned to the ATIP team in Mahalapye, and the senior sociologist from this department is a member of the external review team. There is a on-going concern about human issues in the design and implementation of the field work, and social variables have been included in the ATIP field surveys which have been conducted to date.

4. Finding, 1984

There is a need for continued structured short-term training of ATIP counterparts.

Recommendation

The ATIP should continue the use of in-country short courses for specific training of Batswana counterparts and others associated with the project. Whenever appropriate they should be given in Botswana, and when necessary the opportunity to attend courses and workshops outside the country should be taken.

Status, 1986: There have been some courses instituted in-country for training of counterparts and others from the MOA, although increased attention needs to be devoted to this activity. Several of the counterparts have been to other countries in the region for courses and workshops. This is a continuing need, and should be given emphasis by ATIP. AID Project funding requirements has been a constraint to more participation in regional activities.

5. Finding, 1984

There is a need and an opportunity for ATIP to have agricultural policy input.

Recommendations

- A. The ATIP Chief of Party, working with his field teams, should consider the policy implementations of their field findings in the farming systems process, through the Director of Agricultural Research to the Policy Committee of MOA.
- B. A MOA liaison in DPS with an understanding of farming systems work be named to work with the chief of party and team in identifying policy issues and drafting statements relevant to policy to feed into appropriate MOA channels.

Status, 1986: Policy issues should be a priority concern of the Chief of Party and the RELO. The review team observes that relatively little formal progress has been made in this area, although a document outlining the institutionalization of FSW in Botswana has been developed by the several FS teams in the country, and this has received no response from the GOB as yet. It is recognized that this is one of the most difficult areas to work in, but one that should receive attention during the remaining life of the contract. A series of policy issues identified by ATIP Field Teams has been completed and will be forwarded to DPS. The ATIP trained DPS liaison person resigned his job and left the MOA in June of 1986.

6. Finding, 1984

Currently graduates of the BAC have little understanding or appreciation of a farming systems approach to research and extension.

Recommendations

- A. Linkages should be established between the RELO and the Principal and staff of the BAC.
- B. Consideration should be given to the integration of FSR into the BAC curriculum for ADs, perhaps through short-term consultancies with FSSP personnel.

Status, 1986: There is still a critical need to integrate the FSW concepts into training at the BAC, since these young people become the field contacts with farmers and could provide effective linkage at the field level between research and extension. It appears that little progress has been made in this area, and the limited initiatives from ATIP toward the college have not received an enthusiastic response.

7. Finding, 1984

The small staff of experiment station scientists are concerned about on-farm testing of crop varieties and practices which have been tested on the station and need verification on farms. The ATIP scientists are interested in keeping close communications with the experiment stations and in conducting a limited number of trials under controlled conditions.

Recommendations

- A. There should be frequent communication between the scientists based at the central research station and the scientists working in the ATIP villages, including visits of experiment station scientists to the farmers' fields.
- B. ATIP personnel should be encouraged to participate in any initiative of the Department of Agricultural Research which is designed for testing component

technology on station and on farm, and which could move new varieties and practices rapidly to the farm for testing.

Status, 1986: There has been collaboration in tillage trials and some variety testing by ATIP for the Sebele-based scientists, both national and CRSP-sponsored. There is a continuing need for the ATIP regional teams to respond to requests from researchers to test technology, and there could be a greater initiative by the ATIP agronomists to seek out potential recommendations from Sebele and take these to the field -- even at a preliminary stage. This would attract more interest from the research community at the station, and build credibility for ATIP and the FS approach within the MOA.

8. Finding, 1984

The chief of party seems to be spending a disproportionate amount of time and energy working on details that could be handled by someone more appropriate. This takes time away from areas where has unique talents in farming systems research and the development parts of the program, including consideration of policy issues.

Recommendations

- A. The team leader should be urged to delgate more of the routine administrative matters to others on the technical assistance team, including the deputy team leader and his counterpart, and the administrative assistant.
- B. USAID/B should explore internal mechanisms to better facilitate the handling of forms and other government procedures in a routinized and specified manner. A clearly defined point of contact within USAID is the project officer, and a clear designate is needed if the principal contact person is traveling or otherwise out of the office.

Status, 1986: The Chief of Party has designated an assistant team leader, in the person of the RELO, to assist in management of administrative details. This has been effective in the case of identifying persons for long-term training, and moving their papers through the system. The COP still spends a disproportionate amount of time in administrative detail, and should find the means to delegate much more of these details to others. USAID can be of assistance in this matter, by helping to streamline procedures and by supporting any appropriate effort by the team to name an administrative person within or outside the group to handle details. The placement of a GOB counterpart would help also.

9. Finding, 1984

ATIP is spread between two departments, DAR and DAFS, and has a close working relationship with the DPS. There is a need to assure that the project continue as an institutionalized integral part of the MOA, to continue beyond the life of the project.

Recommendations

- A. A Motswana be assigned as interim counterpart to the chief of party, subject to approval of both the ATIP project and the GOB.
- B. Thought be given in the MOA to where the ATIP should be institutionalized.
- C. The RELO be a senior established post to effect liaison between research and extension groups in MOA.

Status, 1986: The ATIP team has collaborated with other FS teams in the country to prepare and submit a proposal for institutionalization of FSW in Botswana. To date there has been no response. This is a critical step in the process of localizing and internalizing the FSW in the country, and should continue to receive priority by ATIP, especially from the COP and RELO. The Agricultural Sector Assessment to be conducted in 1987 may lead to a research strategy that could include FSW.

10. Finding, 1984

The commercial seed production facility as planned for Botswana in the ATIP has been delayed in implementation.

Recommendation

Attention needs to be paid to the recommendation in the project paper on the seed requirements of Botswana.

Subject to availability of resources from the GOB, this activity should be initiated to solve the current seed crisis and build a long-term potential for quality seed production in the country.

Status, 1986: Administrative details about who will finance this project and where the facilities will be located have been worked out, with substantial contributions expected by both UNDP and the GOB. Seed production has taken a quantum leap during the past two years, and this is a priority area which appears to be receiving much attention. AID will finance the T.A. portion of SMU with ATIP funding for two years.

BRADY CHECKLISTS FOR ASSESSING ORGANIZATION EFFECTIVENESSUSER NOTES BY JIM BRADY AID/W

1. TREATING THE ORGANIZATION AS A SYSTEM: The two checklists which follow are designed to help you assess the general effectiveness of an organizational system or institution. We treat an organization as an "open system" of inter-related and inter-dependent components (subsystems) which are coordinated to achieve organizational goals within given timeframes.

The major system components included in the assessment are GOALS, INPUTS (RESOURCES), RESOURCE CONVERSION or MANAGEMENT PROCESSES, OUTPUTS, and MONITORING/FEEDBACK MECHANISMS. The system's operations are commonly helped or hindered by external factors or CONSTRAINTS over which it may have little control. However, the negative effects of external factors can sometimes be reduced through competent and pro-active leadership.

2. ELEMENTS OF EFFECTIVENESS: Effectiveness is determined by the skill with which the organization's leadership and staff perform the following kinds of tasks:

- (1) mediate between the organization and its external environment (e.g., changing external constraints or coping with them);
- (2) acquire and effectively use inputs to produce outputs which are desired by clients or consumers in the external world;
- (3) create a positive organizational climate which encourages and rewards employees for striving to innovate and improve operations and output;
- (4) use goals, strategies, structures, policies, etc. to integrate and motivate organizational units and work groups to perform efficiently; and,
- (5) monitor system performance and external impact and take corrective action as needed to stay on course or respond to significant internal or external changes.

3. USING THE RATING SCHEME: We have set up the ratings to provide an overall range from -100 to +100 for the primarily internal elements effecting ORGANIZATIONAL EFFECTIVENESS. The overall ratings on ENVIRONMENTAL CONSTRAINTS range from -50 to +50. Most individual items on each checklist have a rating which ranges from -2 to +2. There are usually five items in each system component or category (e.g., INPUT: HUMAN RESOURCES is a category). The exception is the MANAGEMENT SUBSYSTEM (or

resource conversion) component which has ten items and is weighted to give twice as many points. (The range is from -4 to +4 for each item). This was done to balance off the various organizational components.

If the particular item in " category is not satisfactory, you could give it a NEGATIVE Rating: -2 or -1. If the item is NEUTRAL in its effect on effectiveness, the rating could be 0. If the item is being handled effectively, you can give a POSITIVE rating of +1 or +2. You can weight certain items which are more important to your particular organization by giving them a higher value. You can also substitute other items for those used here. Space for a summary of rating is given on page 19.

In assessing the general viability of an organization, it would thus be necessary to include both the rating of Organizational Effectiveness and the rating of Environmental Constraints. Is the Environment essentially negative, positive, or neutral? The ideal would be a highly effective organization functioning in a positive environment. If the organization is low on effectiveness and the environment is also negative, then the potential for survival will probably be low. Naturally, the scheme will more useful if the ratings and conclusions are made by people who are quite familiar with the organization and its working environment.

CHECKLIST #1 - ESTIMATING THE POSSIBLE IMPACT OF  
EXTERNAL CONSTRAINTS ON A DEVELOPMENT ORGANIZATION  
OR PROGRAM

Jim Brady  
*R.E. McCOLAUGH*

TYPES OF CONSTRAINTS MACRO/MICRO LEVELS		POSSIBLE IMPACT (Negative-Neutral-Positive)				
-----						
C1.	POLITICAL CONSTRAINTS:					
C1.1	Stability of political conditions (national and/or local)	-2	-1	0	+1	+2
C1.2	Support given to the organization by political leaders and other key elites	-2	-1	0	+1	+2
NOTE: MICRO INDICATORS are enclosed as (C1.2):						
(C1.2)	Adoption of either FSR/E or T/V requires almost total resource allocations devoted to the small scale farm sub-sector; normal export or plantation crop producers will receive much less attention from public service agencies. This elite must either fully support these new initiatives as needed social innovations or early-on be provided alternative support systems.					
C1.3	Relationship between political leaders and current management of the organization	-2	-1	0	+1	+2
C1.4	Level of PUBLIC SUPPORT for the organization (demand for outputs)	-2	-1	0	+1	+2

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TYPES OF CONSTRAINTSPOSSIBLE IMPACT  
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(Cl.4) In both T/V and FSR the client plays a major role, he/she is an active team member as well as a major risk taker. Will this sector support these programs, knowing their needed labor and capital inputs and possible risks?

TYPES OF CONSTRAINTS		POSSIBLE IMPACT				
C1.6	Is general political climate conducive to new programs?	-2	-1	0	+1	+2
C1's	SUBTOTAL (Range: -10 to +10):					
C2 LEGAL CONSTRAINTS						
C2.1	Legal restrictions on operations (Are new laws decrees required for proposed programs?)	-2	-1	0	+1	+2
(C2.1)	If foreign technical assistance is to be provided can this be done? What of importation of equipment or plant materials? Use of vehicles for work after normal governmental working hours, etc?					
C2.2	Legality of actual/proposed personnel systems (e.g., using extensionists for new FSR/E services)	-2	-1	0	+1	+2
C2.2	Will host country nationals (HCNs) be assigned permanent positions that provide for career development within the Ministry framework or only seconded to the project until donor support stops? What % of their time will be with the specific project and what part with other Ministry duties?					
C2.3	Legality of proposed budgeting and finance systems (e.g., Can org. collect/use fees as income?)	-2	-1	0	+1	+2
C2.3	Will project staff have control of donor funds and if so, how? Will Ministry "counterpart" budgets be assigned at a local level for project use and control or held in a general fund or at headquarters?					

TYPES OF CONSTRAINTS		POSSIBLE IMPACT				
C2.4	Authority granted to program managers to make decisions (e.g., can use funds without lengthy approvals or pre-audits)	-2	-1	0	+1	+2
(C2.4)	What are the working relationships between expats and HCNs and what will be the teams access mode to donor funds or national budgets? What input will they have each year for technical and fiscal planning of their project needs?					
C2.5	Equality of people under law (equity in access to services)	-2	-1	0	+1	+1
C2's	SUBTOTAL (Range: -10 to +10):					
C3. ECONOMIC CONSTRAINTS:						
C3.1	Ability of local/national governments or other key supporters to fund the program (i.e., after external aid ends)	-2	-1	0	+1	+2
(C3.1)	Will the host country (HC) be able to support; first, their stated counterpart funds, and second will the host country agency, (HCA) staff the project with permanent employees or only on contractual status? During the life of the Project (LOP) what will be, or has been, the % rise of allocations each year for the total Ministry budget and that of the FSR or T/V project? Will this yearly increase lead to full national support at the project termination or will another donor or add-on be required?					
C3.2	Financial ability of clients to buy organization's services	-2	-2	0	+1	+2

TYPES OF CONSTRAINTS		POSSIBLE IMPACT				
C3.3	Ability of private sector to support the program (e.g., to provide it services/supplies)	-2	-1	0	+1	+2
C3.4	Adequacy of infrastructure in program area (communications, transportation, markets, etc.)	-2	-1	0	+1	+2
(C3.4)	Will the project staff have proper kinds and numbers of transport assigned directly to them, and will they be allowed to use these for work purposes, say after 5 p.m., and on weekends etc? Will gas, oil and tires be funded? Will the necessary inputs for research trials or extension demonstrations be available in a timely manner? Will needed housing, offices, and support facilities be provided on time and during the entire LOP?					
C3.5	Does organization now provide enough services to economically justify its continuation?	-2	-1	0	+1	+2
(C3.5)	Attainable and quantifiable goals should be established in terms of technology packages to be developed, regions to be serviced, and farmers to be treated. Additionally, these research findings or extension methodologies should be in a form which can be extrapolated to other clients or analogous areas. These must be quantifiable, allowing for needed economical justifications for project continuation later.					
C3's	SUBTOTAL (Range: -10 to +10):					

TYPES OF CONSTRAINTS		POSSIBLE IMPACT				
C4.	SOCIO-CULTURAL CONSTRAINTS					
C4.1	Community attitudes toward work, achievement, and social change	-2	-1	0	+1	+2
C4.2	General attitudes toward specific changes sought by the organization	-2	-1	0	+1	+2
(C4.2)	Both FSR and T/V systems require much more field work and longer hours than is normal in most agriculture ministries. Thus, a real change in attitudes must take place, in that researchers have to go to the field and work with and learn from farmers, and extension agents must meet with key farmers on a very tight cropping schedule. In addition, both researchers and extension personnel may have to do manual labor "below their status".					
C4.3	Level of cooperation between the organization and the community.	-2	-1	0	+1	+2
C4.4	General attitudes toward honesty and corruption (organizational impact)	-2	-1	0	+1	+2
C4.5	Ability of schools to provide the organization with needed skills	-2	-1	0	+1	+2
(C4.5)	Formal schools would have to train new technicians for these systems, as well as an intensive in-service training component with present Ministry staff.					
C4's	SUBTOTAL (Range: -10 to +10):					

TYPES OF CONSTRAINTS		POSSIBLE IMPACT				
C5.	TECHNICAL CONSTRAINTS:					
C5.1	Availability of needed technology	-2	-1	0	+1	+2
C5.2	Availability of qualified staff to adapt and spread technology	-2	-1	0	+1	+2
(C5.2)	In some cases under FSR or T/V the clients will be new, requiring technicians to change working modes and styles. In other cases female agricultural exchange agents or researchers will need to be included on the team to deal with the women farmers.					
C5.3	Capacity of program clients to adopt/adapt new techniques	-2	-1	0	+1	+2
(C5.3)	For these systems to produce new research results or the application of new farming packages provided by extension, the farmers must see themselves as a part of the process and not just observers. They must feel it is their project, not just some ministry plot. This requires a very special type of public sector employee to make it work.					
C5.4	Ability of local delivery systems to reach target areas and clients	-2	-1	0	+1	+2

TYPES OF CONSTRAINTS	POSSIBLE IMPACT				
(C5.4) Both systems require high inputs and complete logistical support programs. Both must be adequately staffed to carry on the projects and provided with sufficient time and resources to carry on the field work. All of these tasks must be carried on in a timely manner, running with the cropping seasons and climatic cycles.					
C5.5 Adequacy of means for monitoring technical change and side-effects	-2	-1	0	+1	+2
-----					
C5's SUBTOTAL (Range 10 to 10):					

CHECKLIST # 2  
A CHECKLIST FOR ASSESSING ORGANIZATIONAL EFFECTIVENESS

ORGANIZATIONAL COMPONENT	POSSIBLE IMPACT*					
	(Negative-Neutral-Positive)					
1. ORGANIZATIONAL GOALS:						
1.1	Clarity of organizational goals and expected outputs	-2	-1	0	+1	+2
(1.1)	Expected outputs must be expressed in terms of numbers of technology packages, regions to be covered, farmers to be serviced, etc. The type of organization that will be built and the people to be trained to staff this during the LOP should also be spelled out very clearly in terms of scopes of work and job descriptions.					
1.2	Support for organizational goals by political leaders and other key elites	-2	-1	0	+1	+2
1.3	Commitment to organization's goals by its managers at all levels	-2	-1	0	+1	+2
(1.3)	Officers and technicians moved to these projects should be on a permanent basis and their job positions should be in the regular career development ladder of the ministry to which they belong. It should be clear from the start that these tasks will be institutionalized and the job will go on after the close of the donor project. Managers should make the goal of institutionalization very clear to all associated with the project.					
1.4	Commitment to organization's goals by its non-managers at all levels	-2	-1	0	+1	+2

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ORGANIZATIONAL COMPONENT		POSSIBLE IMPACT (Negative-Neutral-Positive)				
(1.4)	Both T/V and FSR must be seen as a regular part of the Ministry of Agriculture's activities, not as some special project. Project design should stimulate non managers in some way, since they may be working much longer hours than others in the system. At a minimum, researchers should be at the farmer sites at least 40% of their time, the extension people even more than this.					
1.5	Extent to which organization's outputs will solve community problems or meet urgent needs	-2	-1	0	+1	+2
1's	SUBTOTAL (Range: -10 to +10)					
2. ORGANIZATIONAL INPUTS: BUDGET AND INCOME						
2.1	Adequacy of budget levels	-2	-1	0	+1	+2
2.2	Approved funds are released when needed (e.g., to pay field staff on time)	-2	-1	0	+1	+2
2.3	Organizational controls over funds and disbursements are adequate but flexible	-2	-1	0	+1	+2
(2.3)	Depending upon the mixtures of donor purchased technical assistance and host country counterparts, the degree of control over project funds and regular operational funds could be very important. The nature of FSR will often require special purchases not contemplated during the start of a cropping year, thus the closer the control to field personnel perhaps the more success the projects will have.					

ORGANIZATIONAL COMPONENT		POSSIBLE IMPACT (Negative-Neutral-Positive)				
2.4	Authority and ability to collect and use income from services, fees, sales, etc.	-2	-1	0	+1	+2
2.5	Adequacy of arrangements to fund programs after outside aid stops (e.g., cost-sharing arrangements)	-2	-1	0	+1	+2
-----						
2's	SUBTOTAL (Range: -10 to +10):					
3. ORGANIZATIONAL INPUTS: INFORMATION AND IDEAS						
3.1	Ability to access new technology in major areas of operation	-2	-1	0	+1	+2
(3.1)	Of special importance to both extension and research projects, is the fact that HCAs must allow free access to new technology. Many ministries do not wish to admit they don't have the latest technology. Understandings must be reached for the importations of genetic materials and the right to field test or put out trials on identified constraints, i.e., it is not just the national soils labs that can do fertilizer testing, but also FSR teams.					
3.2	Linkages between the organization and local talent and expertise	-2	-1	0	+1	+2
3.3	Linkages between the organization and international talent/expertise	-2	-1	0	+1	+2
(3.3)	Whenever possible these exchanges and linkages should be written into the project. Most of the U.S. universities will not know how to do FSR or T/V and will need to access other technical experts for implementation assistance.					
3.4	Quality of efforts to obtain new information/literature (through subscriptions, exchanges, etc.)	-2	-1	0	+1	+2

ORGANIZATIONAL COMPONENT		POSSIBLE IMPACT (Negative-Neutral-Positive)				
(3.4)	Not only is information access important but the mode of project documentation control, for later proper dissemination of the information, must also be taken into account. Efforts should also be made to analyse this data as well as project developed information and move or transform it into literature for each special group of clients. Most projects make no arrangements for this to happen.					
3.5	General creativity in tapping employees, clients, etc. to find better ways of doing things	-2	-1	0	+1	+2
-----						
3's SUBTOTAL (Range: -10 to +10):						
4.	ORGANIZATIONAL INPUTS: HUMAN RESOURCES					
4.1	Adequacy of overall staff levels (for achieving current goals)	-2	-1	0	+1	+2
4.2	Match between specialities of current staff and work to be done	-2	-1	0	+1	+2
4.3	Success of organization in attracting high quality staff	-2	-1	0	+1	+2
4.4	Turnover rate among managers	-2	-1	0	+1	+2
4.5	Turnover rate among non-managers	-2	-1	0	+1	+2

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 ORGANIZATIONAL COMPONENT                      POSSIBLE IMPACT  
 (Negative-Neutral-Positive)  
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(4.4&4.5) Projects should not be designed to send out the best HC people for long term training so that they can fit into the project later. Train what you have in-country and develop quality training modulars as you go. The average public sector employee (Latin America data) stays at his assigned tasks only 1.4 years, so the training exercises will go on forever.

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 4's    SUBTOTAL (Range: -10 to +10):

5.    ORGANIZATIONAL INPUTS: FACILITIES

5.1	Impact of organizational location on operations	-2	-1	0	+1	+2
5.2	Quality of building/physical plant	-2	-1	0	+1	+2
5.3	Adequacy of work space per worker	-2	-1	0	+1	+2
5.4	Adequacy of equipment and supplies (vehicles, office equipment, etc.)	-2	-1	0	+1	+2
(5.4)	Both systems are highly dependent upon logistical support. Assignment of project transportation that belongs to the team at all times should be a goal.					
5.5	Adequacy of staff support services (recreation, health, food, etc.)	-2	-1	0	+1	+2

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 5's    SUBTOTAL (Range: - 10 to +10):

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ORGANIZATIONAL COMPONENT		POSSIBLE IMPACT (Negative-Neutral-Positive)				
6 MANAGEMENT SUBSYSTEMS (CONVERSION PROCESSES)						
6.1	Quality of linkage between overall goals and each unit's objectives (employees understand how their work supports org./unit goals)	-4	-2	0	+2	+4
6.1	These linkages, between the needed extension input and up-front research needs, should be quite formal. Written agreements between agencies that clearly state the responsibilities of each party are a must. Job descriptions and scopes of work should be developed for every member of the team, including any special contractor T.A. provided.					
6.2	Flexibility of organizational structures and procedures in helping staff get the job done	-4	-2	0	+2	+4
6.3	Openness and objectivity of communications up, down, and across the organization (e.g., receptivity of leaders to ideas from below)	-4	-2	0	+2	+4
6.4	Clarity of individual and group performance standards at all levels of the organization (e.g., each worker knows the difference between good and bad performance)	-4	-2	0	+2	+4
(6.4)	Job descriptions, plans of work, specific goals, and minimum hours required are all important. Management support records for work performed, that can be used to help in the next year's planning and work assessments, are also quite important.					

ORGANIZATIONAL COMPONENT		POSSIBLE IMPACT (Negative-Neutral-Positive)				
6.5	Extent to which senior managers serve as leaders and role models to inspire high performance (good match between policy and practice)	-4	-2	0	+2	+4
(6.5)	Systems leaders must be in the field doing research, in-service training, or extension demonstrations. Where the systems have failed in the past there was much evidence that the leaders were at headquarters and not in the field with the farmers and their own technicians.					
6.6	Effectiveness of organizational reward systems in encouraging innovation and excellence (staff feels free to try new things)	-4	-2	0	+2	+4
6.7	Quality of systems for encouraging and supporting staff development and professional growth	-4	-2	0	+2	+4
6.8	Level of inter-group or inter-unit cooperation within the organization (strength of team work in meeting organizational or unit priorities)	-4	-2	0	+2	+4
6.9	Quality of internal staff work and support services (error level)	-4	-2	0	+2	+4
6.10	Ability to control costs	-4	-2	0	+2	+4
6's SUBTOTAL (Range: -40 to +40)						

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ORGANIZATIONAL COMPONENT		POSSIBLE IMPACT (Negative-Neutral-Positive)				
7. OUTPUTS AND EXTERNAL IMPACT						
7.1	Acceptance of services products, etc. by clients	-2	-1	0	+1	+2
(7.1)	The client must be built into research from the start. All too many programs use the farmer's field and not the farmer. In the T/V programs unless there is up to date site specific research available the farmer and change agents will get burned. Do research institutions have packages of technology for a specific area, will they give what they have and could the dissemination of these cause the extension service to lose credibility?					
7.2	Level of general community support (e.g., organization's public image)	-2	-1	0	+1	+2
(7.2)	Systems will gain public support if their products or methodologies can be extrapolated to other areas. In order to do this projects must be making constant appraisals to know where they are and where they need to be. Systems should be designed into the project to accomplish this.					
7.3	Ability of organization to compete with other organizations (e.g. in obtaining resources)	-2	-1	0	+1	+2
7.4	Effectiveness in monitoring its overall performance and then acting to correct unwanted deviations from action plans	-2	-1	0	+1	+2

ORGANIZATIONAL COMPONENT		POSSIBLE IMPACT (Negative-Neutral-Positive)				
7.5	Organization's ability to predict and prepare for external changes (being pro-active versus reactive)	-2	-1	0	+1	+2
7's	SUBTOTAL (Range: -10 to +10):					

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SUMMARY OF RATINGS

A. EMVORPM,EMTA: CPMSTRAOMTS:

- 1. Political-----
- 2. Legal-----
- 3. Economic-----
- 4. Socio-cultural-----
- 5. Technical-----

TOTAL-----

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B. ORGANIZATIONAL EFFECTIVENESS:

- 1. Goals-----
- 2. Inputs: Budget and Income-----
- 3. Inputs: Information and Ideas-----
- 4. Inputs: Human Resources-----
- 5. Inputs: Facilities-----
- 6. Management Subsystems-----
- 7. Outputs and External Impact-----

TOTAL-----

ACRONYM LIST FROM 1984 EVALUATION REPORTUSEFUL ABBREVIATIONS AND ACRONYMS

AD	Agricultural Demonstrator
ALDEP	Arable Lands Development Program
APO	Animal Production Officer
APRU	Animal Production Research Unit
AS	Agricultural Supervisor
ATIP	Agriculture Technology Improvement Project
BAC	Botswana Agricultural College
BAMB	Botswana Agriculture Marketing Board
CAM	Collaborative Assistance Mode (AID contracting)
CDO	Community Development Officer
CDSS	Country Development Strategy Statement
CFDA	Communal First Development Area
CIMMYT	International Center for Corn and Wheat Improvement
CCPO	Chief Crop Production Officer
CPO	Crop Production Officer
CRSP	Collaborative Research Support Programs
DAFS	Department of Agricultural Field Services
DAH	Department of Animal Health
DAO	District Agricultural Officer
DAR	Department of Agricultural Research
DAS	District Agricultural Supervisor
DLFRS	Dryland Farming Research Scheme
DPS	Department of Planning and Statistics
DtPS	Deputy Permanent Secretary
EESAIP	Evaluation of Farming Systems and Implements Project
FI	Farmer-implemented (farm trial): contrast with RI

FM Farmer-managed (farm trial): contrast with RM

FSAD Farming Systems Approach to Development

FSAR Farming Systems Approach to Research (ATIP team)

FSR Farming Systems Research (generic for FSAR)

FSP Farming Systems Perspective (ATIP term which means "involving the influence and of relevant policies and support systems")

FSSP Farming Systems Support Project

GOB Government of Botswana

HH Household

IARC International Agricultural Research Center(s)

ICRISAT International Center for Research in the Semi-Arid Tropics

IFPP Integrated Farming Pilot Project

INTSORMIL Grain Sorghum and Pearl Millet CRSP

KSU Kansas State University

LUPAG Land Use Planning and Advisory Group

MFDP Ministry of Finance and Development Planning

MIAC Mid-America International Agricultural Consortium

MOA Ministry of Agriculture

MVRU Multiple Visit Resource Utilization (Survey: ATIP FSAR teams)

NDP National Development Bank

ODA Overseas Development Agency (U.K.)

OPEX Operational Expert

PACD Project Assistance Completion Date

PASA Participating Agency Service Agreement

PS Permanent Secretary (of the MOA)

RAO Regional Agricultural Officer

RD Recommendation Domain

REC Research Extension Coordinator

RELO Research-Extension Liaison Officer

RI Researcher-implemented (farm trial): contrast with FI

RM Researcher-managed (farm trial): contrast with FM

RSU Rural Sociology Unit

SADCC Southern African Development Coordination Conference

SAMDP Southern Africa Manpower Development Project

SMU Seed Multiplication Unit

TA Technical Assistance

T-4 Next to beginning level technical (non-certificate)  
GOB hire

T-5 Beginning level technical (non-certificate) GOB hire

TGLP Tribal Grazing Lands Program

USAID/B U.S. Agency for International Development Mission in  
Botswana

USDA U.S. Department of Agriculture

VDC Village Development Council

ATIP Evaluation Report, June 1986

## List of KEY ISSUES for Discussions with AID/Botswana

1. Has the concept of FARMING SYSTEMS WORK been adequately conceptualized by ATIP and articulated to the GOB, and has this been accepted as a valid operating mode of organization for future collaboration of research and extension? If this is not the case, is there indication that this strategy will be accepted during the life of the project?
2. Does the current ATIP team have adequate participation and interaction of the CHIEF OF PARTY in conceptualizing each local program, setting priorities, scheduling of quality time with staff, and in the broader issues regarding institutionalization and implementation of the FSW approach in Botswana?
3. Are there adequate LINKAGES established with EXTENSION, and is this group within the MOA implementing some degree of FSW in their current duties in each district where the project is operating? Has communication with women farmers been given a high enough priority in design of linkages with extension?
4. Are there adequate LINKAGES with the RESEARCH establishment at Sebele, elsewhere in the country, IARC's, and other research programs to provide technical backstopping, and could this be strengthened with a stronger emphasis on FSW and interaction with ATIP? Has there been adequate attention paid to livestock as a component of the farming systems.
5. Is there adequate involvement of the RURAL SOCIOLOGY UNIT to provide technical inputs into FSW and if not how might this be strengthened?
6. Has the ROLE OF THE RELO been adequately articulated, and is this an effective role in getting research and extension together? Does an effective method exist for confirming research results on farms, and a transfer mechanism for moving valid information through extension to the farmer? What is needed to make the RELO position more effective?
7. Does the current and planned COMPOSITION OF THE TA TEAM reflect the goals and priorities of the ATIP, and will they be able to achieve these goals? Are their skills in local language and communication sufficient? Have social sciences made an adequate input into the design of specific team activities, as well as into the overall project strategy?
8. Are the design changes suggested by the on-going multi-donor FS projects, especially the establishment of the FSW LINKAGE TEAM and its location at Sebele, consistent with the goals of the ATIP, especially the institutionalization of FSW and localization of the specific field teams? What is the logical time frame for this shift of TA staff, and would this require a special amendment to the Proag? Is this dependent on the forthcoming Agricultural Sector Assessment and probable National Agricultural Research Strategy which will follow?

9. Has USAID SUPPORT AND PROJECT MANAGEMENT been adequate for implementation of the ATIP, and are there modifications in the contract which would facilitate this process?

10. Has the GOB CONTRIBUTION TO ATIP been adequate for successful implementation, and has it been consistent with the contract as signed by both parties? This includes operational funding, counterpart assignment, support services such as housing (especially for Botswana counterparts), and training funds?

11. Are there activities of OTHER NATIONAL PROGRAMS financed by other donor agencies and bilateral programs which need to be considered in the overall process of institutionalization of FS in Botswana, and is this integration being adequately addressed by ATIP.

12. What is the ROLE OF ATIP IN THE TESTING OF AVAILABLE TECHNOLOGY from the research programs and from elsewhere, and what is the logical role in developing new technology? Does the project have a logical role in identifying priority constraints to production, and in transmitting these to the commodity research programs?

13. What is the POTENTIAL FOR COOPERATIVE ON-FARM research and validation of technology work between ATIP and the research groups at Sebele, and where do other FSW projects in Botswana fit into this picture? Has the important and unique role of women in decision making and farming been taken into consideration, especially in on-farm implementation of research?

14. What role should ATIP play in planning and policy development? The potential for FARMING SYSTEMS WORK TO AFFECT POLICY at the national level needs to be explored further in Botswana. When key information is collected from farmers in a region about the effects of national policy on their potential production and income, it is possible to identify possible modifications in policy which will enhance farmers' success. There is a need for the ATIP staff, and especially the COP, to work with colleagues in the MOA to identify these key issues and to provide information to DPS decision makers when there are specific interventions which the government should consider to help the limited resource farmer.

15. Should AID consider an ATIP II program? Depending on project maturity and changing national priorities, a partial redesign of the project might be called for in late 1987. Adjustments could be made in team composition, locations, and responsibilities at that time. If formal working agreements can be put in place during the present LOP for active extension participation in FSR, and if the farming systems approach is made an integral part of research and extension programs, then the evaluation team recommends that an ATIP Phase II follow-on program be considered by USAID/Botswana.

ATIP Mahalapye Beneficiaries

## A. Characteristics of ATIP Mahalapye Trial Participants

This note presents a characterization of the farmers who have participated in ATIP Mahalapye trials. All farmer implemented trials are included. RI trials which involved superimposition of a treatment on a farmer's own plot are also included. Other RI trials were directed at researcher assessment. Since farmer involvement was insignificant, these trials have not been included.

Listed in Table 1 are the number of farmers who agreed to participate in a trial. In several cases, not all farmers agreeing to participate in a trial were actually able to implement the trial. The following sub-divisions have been made for each trial:

1. Male versus female headed household.
2. Poor (0-15 head of cattle) versus rich (more than 15 head) (Fifteen head is approximately the median for cattle holdings. Households with more than 15 head but less than 40 head are considered by the GOB to be resource poor farmers.)
3. Draft control versus dependent (hire or cooperate).

For each trial it is indicated whether the primary contact among household members were females, males or both.

The following notes facilitate interpretation of farmer participation patterns:

1. According to the 1983 Crop Management Survey, the distribution of the three identified characteristics in Shoshong East and Makwate (based on 116 farmers) were as follows: 60% male and 40% female, 52% poor and 48% rich, 62% control and 38% dependent. It further might be noted that 73% of female headed households were poor and only 50% of female headed households controlled draught resources. Of draft controllers, only 31% were female headed households in 1983. This proportion has fallen to as low as 10-15% since 1983 due to the drought. Similarly, a majority of draft controllers (57%) were rich in 1983. Given these patterns in the population, it has been neither feasible nor desirable to target for one characteristic (eg. draft control or poor) without this targeting affecting sample composition with respect to other characteristics.
2. Early tillage-planting trials were not narrowly targeted. It was hoped that even draft dependent households might be able to take advantage of modified tillage practices. However, during the first two seasons, draft dependent and female headed households lacking male labour to do ploughing were unable to implement multiple tillage and planting operations.

Thus, during years three and four, tillage-planting trials were directed at draft controlling households and those with sufficient labour resources. Because few female households have both the labour and traction needed to implement the proposed interventions, few were included in testing the interventions.

3. Aside from the tillage-planting trials which were intentionally directed toward draught controlling households (and as a result favoured richer and male headed households), 61% of trial participants were male headed compared to 60% of trial participants were male headed compared to 60% in the population, 45% had more than 15 cattle compared to 48% in the population, and 55% controlled draught resources compared to 62% in the population. So for trials applicable to all types of households, trial participation closely reflected population characteristics.
4. All seeding and crop-variety trials (the seed treatment trial, cropping comparison trials, sole planting trials, and cowpea tillage-planting trial) and post-establishment trials (thinning, undersowing, replanting, transplanting) have been directed toward the female decision-makers in households, regardless of who was the head of a household. Women have been the individuals contacted for each of these trials and have been the ones who have implemented the proposed trials.
5. Since it appears that the structure of decision-making in Botswana households is such that male and females participate jointly in most decisions, both female and male heads and spouses have been included, whenever possible, in discussions of trial participation.
6. Beginning in year three, non-ATIP cooperators were recruited to participate in trials. A majority of trial participants in year four were not original ATIP cooperators. This is due to: the expanded programme in Makoro, a greater diversity of field circumstances was needed in year four to evaluate double ploughing, and concern over participant fatigue on behalf of original cooperators. Baseline data have not yet been collected on the new trial participants but selected data will be collected during the end-of-season assessment surveys.
7. Participation in the Seed Treatment trial was biased toward draught controlling and richer households since the trial required farmers to have at least 10 kgs. of sorghum seed retained from the prior harvest (a drought season).
7. Participataion in the 1985-86 Row Planting Trial was similarly biased since participants were required to own their own row planter.

8. On some trials, targeting was primarily based on variables not included in the above sub-divisions. For example, the Draught Management Trial took into consideration type of draught. The Intensive Production Trials involved site selection appropriate for intensive production (soil, topography, access to manure, etc.). The 1985-86 Double Ploughing Trial necessitated selection based on soil type, ploughing history or weed development. In such cases, socio-economic criteria received less attention when selecting participants.
9. The pattern of trial participation was somewhat affected by the drought: poorer, draught dependent and female headed households tend to be more at risk during drought and consequently have shown less willingness to participate in trials (and when agreeing to participate have had difficulties implementing).
10. Females obviously were the primary contact in female headed households even for those activities for which males would otherwise have been the primary contact.
11. In most male headed households which hire draught, women do essentially all the activities and make most all decisions regarding the cropping enterprise. Female decision-makers are also dominant in some male-headed households controlling draught resources (for example, if the man spends much of the time at the cattle post). For these households, women were generally the primary contact regardless of the particular trial activity.

It might be noted that in most cases the respondents to our surveys have been women. This was particularly true of the MVRU, where more than 90% of the interviews were with women. The instructions for most subject surveys were to interview together the senior males and females of each household, when both were present. In general, it was the males who were not present if either was absent. Males were specifically targeted as respondents only for questions relating to traction use, cattle management practices, and animal inventory changes.

With reference to other characteristics such as draught control and cattle assets, the survey respondents should have been representative due to the sample selection procedures (stratified random sampling with strata selected proportional to their representation in the population for ATIP cooperators, supplemented by a randomly drawn sample).

#### B. Direct Beneficiaries of ATIP Trial Participation

This section indicates how many farmers actually implemented ATIP trials, as opposed to those who agreed to implement a trial. We also indicate what direct benefits participants received besides knowledge gained from trial participation.

In general, farmers have received the seed required for each trial, have had access to ATIP equipment when new equipment was required, and have kept all resulting production. Most ATIP trials ranged from .2 to .3 has. Seeding rates varied but, as a rule, large seeded crops were provided at 10 kgs/ha, sorghum at around 9 kgs/ha and millet at 4-5 kgs/ha. Farmers usually were required to do post-establishment practices. The average figures for production received by trial participants can be ascertained from the ATIP Annual Reports.

ATIP has adopted the approach of providing seed since (a) seed is scarce, (b) uniform seed lots help with trial analysis, and (c) the incentive effect is required during drought. In addition to direct benefits during trial participation, ATIP farmers benefited from (a) advice on government programs and (b) access to ATIP equipment when it was not otherwise required for trials implementation.

#### 1982-83

1. Evaluation of Planting Methods: 18 of 22 farmers actually implemented. Three or four households which did not implement were female headed, three of four were draft dependent, and three of four were poor. All participants received seed, were loaned equipment - including a plow-planter, single row planter and a harrow - for trial implementation, and kept all resulting harvest from the trial.
2. Double plowing: Large plots were early plowed for 2 farmers using an ATIP hired tractor. Farmers later planted the plots, one using an ATIP provided plow-planter. Seed was given to farmers and they kept the production.
3. (RMRI) sorghum intercropping: A large plot on one field (male, draft control, rich) was plowed and planted by ATIP. ATIP hired laborers undersowed several crop-varieties of legumes. The farmer retained the production.

#### 1983-84

1. Post-Emergence Harrowing: no benefit since the one farmer did not implement. He was offered use of an ATIP harrow.
2. Effects of Early Tillage: Three early tillage strips were plowed all the way across two farmers' fields. The farmers were to cross plow-plant, using their own traction and seed. Any increases in yield would have been kept by farmers, but increases were quite small.

3. Bird scaring: ATIP installed for farmers bird scaring tape on four separate sites. Any increased production due to reduced bird damage was kept by farmers (again, quite small).
4. N and P Benefits: ATIP superimposed P on the planting methods trial of 10 farmers. ATIP provided the P and ATIP staff broadcasted it. Of the six farmers not receiving phosphate strips, 4 were male, 3 controlled draft, and 2 were rich. There was little yield benefit received.
5. Sole Plowing and Planting Methods: only 6 of 16 actually implemented. Of the six who implemented, 4 were male, 5 controlled, 4 were rich. All received seed and were loaned row planters, cultivators and harrows for trial implementation. Several also used the row planters and harrows on their own plots. Small but significant increases in yield were obtained in the trial relative to traditionally plowed plots.
6. Draft Team Management: A five farmers received enough wheat straw and minerals for their draft teams to be fed for the first two months of the plowing season. Any benefit from earlier plowing due to stronger animals was left to the farmers.
7. Cowpea Cropping Comparisons: Enough cowpea and sorghum seed was received by all participants to plant 1600 sq. meters. Only 16 actually implemented and these farmers kept all resulting production.
8. Lands Area Vegetable Plot: a small vegetable plot was prepared by ATIP, including addition of sand and manure, but the farmer did not plant the plot.
9. Plow/Planter: ATIP loaned the plow-planter equipment to three farmers and helped with required adjustments to get the implement working.
10. Seed Treatment: ATIP treated 5 kg seed lots of retained sorghum for 15 farmers. Twelve actually planted seed. No significant increase in yield was obtained.

#### 1984-85

1. Intensive Production 1: small vegetable plots were prepared (sand and manure) for 7 of and initial 15 farmers. Participating farmers also received seed. No production was obtained.
2. Intensive Production 2: 5 farmers were advised on site selection and were helped with the addition of manure to high potential sites. Seed was provided as was advise on post-establishment practices. Initial stands were not good enough to warrant a continued intensive approach.

3. Tillage-Planting Scheme: only 8 of the original 16 farmers actually implemented the trial. These farmers received seed and access to row planters. Small but significant increases in yields were retained by the farmers.
4. Cropping Comparisons: all 25 farmers received seed but only 17 planted the seed. Crop-varieties included cowpeas, groundnuts, mung bean, tepary, etc. Farmers retained all production.
5. Cowpea Tillage-Varieties: 8 farmers were asked to plow 800 sw. meters. ATIP staff did all the hand planting and provided all seed. Farmers did post-establishment management and kept the production.
6. Mineral supplement for goats: for nearly two years, beginning in 1984, 6 farmers have received from ATIP minerals for their goats. This is an informal activity initiated by the Francistown animal scientist.
7. RMRI - sorghum factorial trial: 5 sites. ATIP did all tillage and planting operations and weed control. Farmers protected the crop, harvested and received a very large production.

#### 1985-86

1. Double-plowing: 20 farmers actually received seed and implemented at least one replication of the trial. Farmers retained all production.
2. Row Planting: 8 actually implemented. All received seed but used their own planters. Farmers were helped with repairs of equipment when needed. Very little production was obtained.
3. Specialized Cultivation: only 6 implemented. All received seed but did all operations. Little production.
4. Sole Planting: 40 farmers received 2-6 types of seed in small amounts. They did all operations and kept all production.
5. Hand Planting: plots ranging from 400 to 800 square meters were planted by ATIP on 13 farmer's fields. ATIP also did an initial weeding. Plots were planted where earlier plantings by farmers had failed. All production will be kept by farmers.
6. Thinning: small plots thinned by ATIP staff in the fields of 5 farmers. Farmers will keep the small production benefit.

7. Transplanting: ATIP staff transplanted plants on the fields of 2 farmers. The plots were quite small but there should be some production benefits to be kept by farmers.
8. RMRI - Sorghum factorial trial: 5 sites. ATIP did all tillage-planting operations. Farmers helped with crop protection and will keep a substantial harvest.
9. RMRI - water harvesting: 3 sites. ATIP did all tillage-planting operations. Farmers will keep small resulting production.

#### Other

1. All farmers participating in the MVRU received watches, both as an incentive and because watches were needed for time reporting.
2. All MVRU and trials farmers participated in at least one field workshop where they were able to review trial outcomes and received free meals.
3. Advice on new practices and government programmes has been given to both trial participants and survey farmers.
4. ATIP village employment: (a) A rain gauge reader in each village. (b) One farmer was hired to manage ATIP donkeys in Makwate for nearly 2 years. He not only received pay but was able to use the donkeys for his own plots. (c) Casual laborers have been hired on several occasions for building ATIP housing, stand counts, weeding, harvesting and harvest stand counts, digging holes, etc.

TABLE 1: ATIP MAHALAPYE TRIAL PARTICIPANTS

	TYPE	TOTAL	MALE	FEMALE	RICH	POOR	CONT.	DEP.	CONTACT
<u>1982-83</u>									
Eval. of Planting Methods	RMFI	22	13	9	12	10	11	11	Both
Double Ploughing	RMFI	2	2	0	2	0	2	0	Male
<u>1983-84</u>									
Post-Emerg. Harrowing	RMRI	1	1	0	0	1	1	0	Male
Effects of Early Tillage	RMRI	2	2	0	1	1	0	2	Male
Bird Scaring	RMRI	4	2	2	1	3	2	2	Female
N and P Benefits	RMRI	10	8	2	7	3	7	3	Both
Sole Plough & Plant. Methods	RMFI	16	12	4	8	8	10	6	Male
Draught Team Management	RMFI	5	5	0	3	2	5	0	Male
Cowpea Cropping Comparison	RMFI	31	22	9	12	19	19	12	Female
Lands Area Veg. Plot	RMFI	1	1	0	1	0	1	0	Female
Plough-Planter	FMFI	3	2	1	3	0	2	1	Both
Seed Treatment	FMFI	15	9	6	13	3	9	6	Female
<u>1984-85</u>									
Intensive Production 1	RMFI	15	9	6	8	7	8	7	Female
Intensive Production 2	RMFI	5	4	1	3	2	4	1	Both
Undersowing	RMFI	13	5	8	4	9	3	10	Female
Tillage-Planting Scheme	RMFI	16	14	2	10	4	13	3	Male
Cropping Comparisons	RMFI	25	18	7	10	15	14	11	Female
Cowpea Tillage-Varieties	RMRI	8	4	4	1	7	6	2	Both
<u>1985-86</u>									
Double Planting	RMFI	43	35	8	--	--	38	6	Male
Row Planting	RMFI	14	14	0	--	--	14	0	Male
Specialized Cultivation	RMFI	12	7	5	--	--	7	5	Female
Sole Planting	FMFI	40	21	19	17	23	20	20	Female
Hand Planting	RMRI	13	7	6	6	7	7	6	Female
Thinning	RMRI	5	2	3	3	2	4	1	Female
Transplanting	RMFI	2	0	2	1	1	0	2	Female
<u>SUB-TOTALS</u>									
Trial Focus									
Tillage		129	103	16	45	27	97	32	
Seeding, Crop-Variety		119	74	45	52	67	68	51	
Post-Establishment Prac.		33	16	17	13	20	12	21	
Other		38	26	12	15	11	25	13	
Trial Format									
RMRI		45	26	19	22	23	27	18	
RMFI		220	161	59	75	76	148	72	
FMFI		58	32	26	32	26	31	27	
Year									
1982-83		24	15	9	14	10	13	11	
1983-84		88	64	24	48	40	56	32	
1984-85		82	54	28	38	44	48	34	
1985-86		129	86	43	29	31	89	40	

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TRAINING PLAN 1986 (DTP)DEPARTMENT OF AGRICULTURAL RESEARCH1. Background

The training objectives of the Department of Agricultural Research, Botswana are to train national scientists so that the Department of Agricultural Research has the long term capacity to undertake Agricultural Research as directed by the Botswana Government, so that the information obtained may assist the Government in implementation of its National Development Plan which in summary seeks to (1) attain self sufficiency in staple crops (2) raise rural incomes through production of agricultural surpluses (3) create rural employment opportunities to reduce migration to urban areas and (4) to save/earn foreign exchange.

A strong national research Department is essential if progress is to be made in agricultural research and in agricultural development. This is because national scientists have a basic understanding of and long association with the local problems encountered, and are in a position to give continuity and substance to the programme of work which is often not the case with short term contract officers.

Training has and is being given high priority in the Department of Agricultural Research. Table 1 shows why this training is necessary and Table 2 shows personnel currently in training by discipline. It is accepted that it is of the utmost importance in the formation of a viable and strong Department of Agricultural Research to staff it with national well trained scientists, so that it can provide the information that the agricultural industry needs and will continue to require in the long term.

2. The Training Perspective

The components of the strategy element (pertinent to training and manpower development), which are required if the principal objectives of the long term strategy for agricultural research are to be achieved, are as follows:- (1) the development of a capability in disciplines critical to collaborative research programmes in order to fill gaps in selected disciplines i.e. agricultural engineering; horticulture; agric. economics; agric. chemistry etc. to (2) attract high quality training applicants for a long term career in agriculture in the Department of Agricultural Research and to (3) provide multi disciplinary training for staff required for adaptive research in relation to the needs of small farmers.

I have listed the above points as they are basic to the development of a strong agricultural research department, which in turn is crucial if the long term objectives of agricultural development in the country are to be fulfilled. Table 3 outlines the planned localization of the establishment of the Department.

Table 1. A Summary of Departmental professional research personnel is as follows:- (Does not include officers on training) (December, 1985)

<u>Discipline</u>	<u>Local</u>	<u>Contract</u>	<u>Project</u>
DAR	-	1	-
CARO	-	1	-
CAPRU	-	1	-
Seed Technology	-	1	-
Farm Machinery	-	1	-
Groundnuts	-	1	-
Sorghum breeding	1	-	-
Sorghum improvement	-	-	1
Weed research	-	1	-
Cowpea improvement	-	-	2
Plant nutrition	1	-	-
Crop rotation	-	1	-
Farming Systems (An. Prod.)	1	-	1
Farming Systems (Agron.)	2	-	3
Farming Systems (Econ.)	-	-	4
Statistics/computer/Data	1	-	-
Agric. Chemist	1	-	-
Agric. Economist	-	1	-
Agric. Engineer (EMU)	1	-	-
Plant Protection	1	-	-
Hort. Research	1	1	-
Melapo research	-	-	2
Range research	1	-	1
Animal Nutrition	1	-	1
Smallstock	1	-	-
Dairy	2	-	-
Animal breeding	1	-	-
Totals	16	10	16/15

Table 2. Officers currently undergoing professional training (Dec. 1985)

<u>Discipline</u>	<u>B.Sc.</u>	<u>M.Sc.</u>	<u>Ph.D.</u>
General Agriculture	4	-	-
Agronomy	-	4	1
Plant Protection	-	-	1
Seed Technology	-	1	-
Animal breeding	-	-	1
Range Science	1	1	-
Animal Nutrition	-	-	-
Horticulture	1	-	-
Totals	6	6	3

N.B. Of the local officers shown in Table 1, 10 have B.Sc's; 5 M.Sc's and 1 a Ph.D.

The Establishment of the Department of Agricultural Research for 1985/86 has 34 professional posts and 21 Adviser/Experts posts.

Table 3 Planned localization of Established Professional Staffing

Expatriates	Anticipated number in post at start of						
	1986 actual	1987	1988	1989	1990	1991	1992
Superscale	3	2	1	0	0	0	0
PR2	1	1	0	0	0	0	0
PR3	4	4	3	2	1	0	0
PR4	0	0	0	0	0	0	0
<u>Batswana</u>							
Superscale	0	2	3	3	3	5	5
PR2	0	2	3	3	5	5	5
PR3	11	14	16	18	19	20	21
PR4	9	9	9	10	10	10	11
Totals	20	34	35	36	38	40	42

- N.B. 1. Does not include officers on training.  
 2. Does not include Advisors/Experts.  
 3. Allows for a modest increase in the establishment.

### 3. Training Objectives for 1986

The priorities for 1986 are to continue with training for localisation of all established posts but to also concentrate on areas that need particular attention i.e. where there are gaps in selected disciplines (e.g. Agric. Engineering; Agric. Chemistry) Agric. Statistics.

### 4. Training programme for 1986

Table 4. Officers departing on training during 1986

(Does not include officers on training as at 31/12/85)

Discipline	B	c.	M.Sc.	Ph.D
General Agriculture			1	
Agronomy			1	
Animal Science			1	
Agric. Engineering (Irrigation)			1	
Agric. Statistics			1	
Agric. Chemistry			1	
Animal Nutrition				1
Seed Technology	1			
Totals		4	5	1

### 5. Evaluation

The Departmental Training plan will be continuously monitored by the Departmental Training Committee which first met on 20/11/85 in response to the Director of Personnel's Savingram ref. DP 22/24 III (89) of 18/7/85.

In concluding I would like to suggest that this topic of Departmental Training plans is closely related with the issue of National Agricultural Research Systems, and the strategy for development of such systems. We have to know (1) how large a research system can or should become, and still be maintained by the national resource base? (2) Does the system reflect priorities? (3) What will be the shape and size of the system in ten years time? I have mentioned this topic as our staff establishment is finite. It is therefore very important to select the best candidates for training programmes. The defining of an agricultural research system would assist in long term training/planning and thus procurement of posts for officers returning from training. Also for their replacement by personnel whilst they are in training so that the work programme can continue. (At the moment we cannot recruit against a post held by an officer undergoing long term training).

## AGRICULTURAL TECHNOLOGY IMPROVEMENT PROJECT

(ATIP)

SECOND EXTERNAL EVALUATION - MID 1986

Findings and Recommendations for Discussion

The second external evaluation team to review the ATIP program found the project to be a well managed scientific effort to collaborate in the development and testing of production technologies suited for low resource Botswana farmers. The Farming Systems approach to technology identification and development has been the force driving this research and extension program. Two teams of Botswana researchers and extensionists, together with MIAC technicians are conducting Farming Systems work in the limited resource regions of Francistown and Mahalapye. During the four years of this project both teams have performed well, working under harsh climatic conditions compounded by exceptionally low and unreliable rainfall patterns.

At this evaluation, the technicians from MIAC are working with Botswana colleagues; several long term training candidates have returned from the States and are assuming key roles on the ATIP FSW teams. Others now in the US will return before the end of the project to be integrated into the ATIP field teams or on-station commodity research groups, the planning division and extension specialist posts.

The evaluation team sought measurements towards: 1) success in institutionalizing effective farming systems work (FSW), and methodology in two regions 2) progress in the preparation of Botswana technicians to localize ATIP field teams, and 3) improved farming systems recommendations developed and tested for each area.

A list of issues and recommendations for discussions between the Government of Botswana, USAID and the contractor are as follows:

1. Issue: Concept of FSW

The concept of farming systems work and a perspective of the total farm environment can contribute to development and dissemination of appropriate improved technology. This approach is difficult to articulate and understand.

Recommendations

A. ATIP should seek to better articulate FSW methodology to decision makers in the GOB in order to promote better interaction with on-station commodity groups and extension.

B. The CIMMYT East Africa Regional Farming Systems Project could be requested to assist in this articulation effort if ATIP and the MOA agree such an intervention would be beneficial to better understanding systems research.

## 2. Issue: Adapting FSW Methodology

ATIP field teams are approaching initial stages of refinement of FSW methodology for fragile ecosystems, such as Francistown and Mahalapye regions. A total team effort is required for this vital process.

### Recommendation

A. More "quality" time needs to be programmed for the entire ATIP team during the LOP to assure completion of this refinement of methodology.

B. The GOB should assign a national counterpart to the COP.

C. The COP should hire additional administrative and computer help within the next 60 days in order to free up more of his time to participate in the refinement of FSW approaches for Botswana.

## 3. Issue: Role of RECU

The role of the Research Extension Coordination Unit has not been adequately defined or implemented within the project or the MOA.

### Recommendations

A. The current placement of the RECU in the office of the Chief Crops Production Officer needs to be examined to see if this allows the RELO to properly liaise between other field service officers and the research divisions.

B. More emphasis by the RELO should be given to local integration efforts between extension and research officers at ATIP sites.

C. Project contributions of each ATIP technician should be measured on individual linkage efforts with extension field personnel and commodity research groups. The RELO could promote this team effort.

## 4. Issue: FSR Institutionalization

The pending plan for FSR institutionalization, if implemented, calls for the creation of a national FSW linkage team stationed in Sebele. What role might ATIP play in this scenario?

Recommendations

A. No major relocation of ATIP staff should be anticipated during the present MIAC contract.

B. An important contribution toward FS perspective into regional programs can be made by each ATIP team member.

C. At the completion of the proposed Agricultural Sector Assessment, findings could provide a better basis for resource allocations within research and extension, including those of FSW.

5. Issue: USAID Donor Support to ATIP

AID support for most project activities has been sufficient; it needs to be expanded to support participation by Batswana and MIAC staff in professional seminars and workshops and permit a broader use of the Research and Operations Fund.

Recommendations

A. A yearly work plan and detailed budget should be developed jointly with AID, and this used as an "ear marking" document for funding proposed project activities.

6. Issue: GOB Support to Project

Contributions of the GOB during the first four years of the project have been at the agreed upon levels. However, serious constraints remain in supplying housing and other benefits to the national technicians assigned to ATIP.

Recommendations

A. As agreed in the contract, supply housing or equivalent support now to all professional Batswana technicians assigned to the ATIP project.

7. Issue: Training Batswana

Training needs are still paramount for public sector agricultural employees. Subject matter specialists in the DAFS are prime candidates for specialized short-term training as well as long-term degree work. The capacity of the Rural Sociology Unit to participate in FSW needs to be enhanced.

Recommendations

A. ATIP should make every effort to send Crop and Animal Production Officers to short courses (4 to 9 months) offered by International Agricultural Research Centers (IARCs) and send senior officers in the Rural Sociology Unit to short courses, seminars and workshops on FSW.

B. Training plans for the remaining life of project using GOB funding (15 person years) should give priority to Field Service Staff and include one member of the Rural Sociology Unit.

C. AID should continue to help identify other funding sources to provide additional training in the project.

D. MIAC should look into means of supplementing current AID funding of Botswana candidates so that additional staff can be provided long-term training.

E. MIAC should improve linkages between trainees in the US and ATIP Botswana operations.

8. Issue: FSW Contribution to Policy and Planning

ATIP is collecting key information at the farm level which could supply valuable input to the DPS concerning effects of national policy on farmers' production and income levels.

Recommendations

The MOA should establish formal channels of communication between Farming Systems teams and the DPS so that timely field data and FSW findings can be included in the policy and planning processes.

9. Issue: FSW clients

At present considerable GOB resources are allocated to low resource farmers located in very marginal farming areas. Should more emphasis be given to more commercially viable farming areas?

Recommendation

This issue should be carefully reviewed in the proposed Agricultural Sector Assessment.

1986 External Evaluation Team

Mr. Larry Abel  
Dr. Carolyn Barnes  
Dr. Charles Francis  
Mr. Louis Mazhani  
Mr. Robert McColaugh  
Ms. Yvonne Merafe

Animal Scientist  
Social Scientist  
Agronomist  
Sorghum Breeder  
Agriculturist  
Social Scientist

## ANNEX I

## SUMMARY OF ISSUES PRESENTED TO EVALUATION TEAM BY ATIP

"There are a number of issues that ATIP would like to bring to the attention of the Evaluation Team so that they can be specifically addressed in the evaluation report. These issues are generally of two types:

- (a) Issues about which no consensus of opinion has emerged among ATIP staff. In certain key areas differences in personal backgrounds and on-going field experiences have led to divergent perspectives among team members. In these areas we recognize there are no right answers but we would appreciate efforts by the Evaluation Team to explore alternatives and synthesize viewpoints with a view to future activities.
- (b) Issues about which there is substantial consensus among ATIP, and which ATIP feel are important to the effectiveness of the project, but which have to be addressed through formal changes in current project agreements.

It should be stressed that no official approval has been obtained obligating the team to address these issues. However, reactions to issues identified below will greatly increase the value of the evaluation to ATIP members."

1. With respect to surveys, the following might be assessed: sample frame censuses, the various formats of the MVRU or MVRQ (particularly the whole household versus income focused versions), the activity survey, exploratory survey formats, and subject surveys. One particularly key issue with reference to survey work is the value of large sample, perhaps region-wide, baseline surveys versus smaller sample subject surveys, relative to their costs.
2. Another key issue is the potential incompatibility between the pragmatic, interdisciplinary orientation between surveys and the requirements for highly focused, large sample surveys for most types of economic analyses (e.g., estimated labour supply or expenditure functions) used in planning agricultural development strategy.
3. With reference to testing, the following alternatives might be compared: factorial RM-RI trials, component testing in RM-FI frameworks (e.g., most of the tillage - planting trials), collaborative (with Sebele researchers) crops - variety trials, the FM-FI approach being tried in Francistown this season, and the farmer groups approach being tried in Mahalapye. The issue of larger numbers of locations and replications versus smaller numbers with closer trials supervision has been a particular problem for ATIP because of the variability in the environment combined with the difficulty of getting implementation during drought.

4. Another particularly key issue in testing work is the problem faced by animal scientists in conducting RM-FI type trials relating to livestock.
5. The Evaluation Team could be quite helpful by identifying what they think are the top research priorities during the remaining life of the project, during a cost extension, and in the long run. It would of course be most useful if activities were discussed in terms of how much attention is needed and what proportion of research resources is warranted rather than making yes - no assessments.
6. Perhaps the Evaluation Team could review progress to-date for the various areas and suggest priorities for each of the time frames mentioned above. This would help ATIP make sure that the work plan to be developed in the coming months forms an effective bridge to future ATIP activities and to long run MOA research.
7. How much emphasis should be placed on FSR in a country like Botswana with limited resources for research and little on-the-shelf technology?
8. Whether, when and how might the goals of FSR institutionalization be revised if the MOA does not soon begin to view FSR as a more vital component of national agricultural development strategy?
9. Should FSR continue to work only in communal areas with resource poor farmers even though many GOB officers may no longer believe much progress can be made in increasing production for this group?
10. The Evaluation Team could be quite helpful if they were to review the institutionalization proposal and rank the relative priority to be given to various elements of the proposal. In conjunction with this activity, the Evaluation Team might suggest some contingencies in case certain elements of the proposal are found to be unacceptable to the MOA.
11. Some ATIP members feel strongly that most future ATIP positions should have national mandates associated with a Sebele linkage team while other members feel continuation of the regional FS teams would be most appropriate. It would be quite useful if the Evaluation Team could attempt a synthesis of ATIP views and relate alternative views to different scenarios depending on MOA reaction to the institutionalization proposal.
12. Economists. Little economic diagnosis can be carried out when FSR is based on a semi-case study approach. Also, economic choice among viable alternatives is not a priority until viable alternatives have been identified. What then should be the role of economists in FSR in Botswana?

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13. Should the economists limit themselves to economics, or should they play an interdisciplinary role? Some might even suggest that, if the economists are to act strictly as economists, it would almost be necessary to make a complete shift to the policy areas since that is where the important economic issues are.
14. Agronomists. Agronomists have had a problem similar to the economists in that they have had to be multi-disciplinary technical scientists. Due to inevitable limited back-stopping from Sebele the ATIP agronomists have acted as soil scientist, crop-variety screeners, weed specialists, entomologists, etc. How broadly focused should the agronomists be?
15. Animal scientists. ATIP animal scientists have had perhaps the hardest role for two reasons: (i) ATIP's primary mandate deals with improvements in arable production even though Botswana's rural economy is dominated by livestock related income and, (ii) one MIAC animal scientist has officially had responsibility for both field locations. Two key issues relating to these problems might be addressed by the Evaluation Team. First, to what extent should the ATIP animal scientists be free to identify and work on priorities for livestock improvement aside from the interface with crop production? A case could be made that ATIP will be seen as being more relevant if greater attention is being given to livestock research. Second, what is the best way to structure relationships with the Mahalapye team?
16. Which activities might best be tested only in Tutume, even if relevant to the Central Region, and which should be tested in both locations? For trials in the Mahalapye area, should the Francistown animal scientists be expected to travel to Mahalapye regularly or should a portion of the Mahalapye team's time be reserved for livestock related activities? If so, what proportion of time should be allocated and what team members should be involved?
17. We consider it to be extremely unfortunate that there is no provision that would allow MIAC (and HCNs') to attend professional meetings to maintain their competence and the provide the potential for meaningful professional interaction.
18. Two additional problems are associated with commitments to long term field positions. First, insights from several years of experience transcend the results of any one or a few research activities. Second, it is difficult to identify reasonable future job opportunities after spending two or more years in Mahalapye or Francistown. Both problems can be addressed by allowing each technician who spends more than one tour on the project to spend 6 or even 12 months back on-campus at

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the end of their final tour? We feel it would be helpful if the Evaluation Team would explore alternatives for adding a provision relating to temporary end of tour assignments. Perhaps a slightly shorter cost extension might be considered in order to use some funds to better take advantage of the experience gained by present technicians.

Evaluator's Notes: No mention was made by ATIP staff on HC counterpart creature comfort needs in their proposed scope of work.

ANNEX J

## FACTORS INHIBITING PROGRESS\*

## ENVIRONMENT

Physical Environment - One of the greatest deterrents to the success of FS work in Botswana is the environment. Because of low and erratic rainfall and poor soils, the possibilities of substantial and/or reliable improvements in agricultural productivity are low at best. It is unlikely that any one precise general recommendation will hold at all times and the optimum strategy may well be very different in years of rainfall above and below the average.

## TECHNOLOGY DEVELOPMENT

Importance of Arable Agriculture - In contrast to many developing countries, Botswana farmers do not depend upon arable agriculture as their main source of income. Whenever possible, farmers pursue other activities which have higher or at least more certain returns to resources such as keeping livestock and working at off-farm jobs. Thus, it is important to take into account the practice of buffering which makes crop technology development difficult.

Available Technology - In Botswana there are relatively few tested technologies available applicable to both wet and dry years, which can be readily adopted by farmers. The lack of these technologies means delays in achieving the purposes of FS.

Lack of Options - Because of the unpredictable climatic conditions in Botswana, it would seem that a concerted effort should be made toward the development of as many practical options as possible for farmers to choose from as the unpredictable season unfolds.

Lack of Flexibility - Unlike the situation which exists in many countries, Farming Systems in Botswana are forced to develop strategies that will break constraints rather than have the luxury of exploiting flexibility. This implies more finely tuned technologies and more radical changes on the part of farmers. Thus, there is greater reluctance to change, and slower progress results.

## SUPPORT SYSTEMS

Lack of an Influential Link with Policy and Support Systems - There are two components to improving productivity: 1) Improving technology and 2) developing policy support systems. Both are needed in determining what types of technology are likely to be relevant. For example, fertilizer recommendations would be inappropriate in areas where there was no source of supply available to farmers.

Administrative Support - There is a reluctance on the part of MOA field staff to become involved with FS work when top administrators appear to exhibit little or no interest in the activity.

\*From: "Progress and Needs in On-farm Research in Botswana," paper presented by ATIP staff at FS Networkshop in Maseru, Lesotho; November 25-28, 1985.

## CREDIBILITY

Poor Credibility - Poor credibility can be partially attributed to the difficulty of achieving quick relevant results in the harsh unstable climate of the country. Lack of credibility has limited the support for institutionalization in the upper echelons of the Ministry.

Expectations of Quick Results - The pressures from donor agencies and government officials for "quick results", whether real or imagined, result in frustrations for FS teams.

## PERSONNEL

Trained Manpower - The lack of trained indigenous manpower is a major constraint to FS progress. Expatriates occupy most of the top research positions, and they change often. Most nationals involved in FS work have diplomas in agriculture. Expatriates working in the country consider formal training to the M.Sc. a prerequisite, given the formidable challenge from the environment. Only the latest two FS projects have had funds for substantial training of nationals.

Lack of Incentives - Work undertaken by FS teams involves substantial field work, often under difficult circumstances. It involves considerable amounts of travelling and often requires living in isolated areas. The lack of suitable incentives often precludes the identification and participation of qualified national staff.

Liaison - Communications between research and extension have improved over the past few years, but much work needs to be done to strengthen relationships. There exists a wide gulf between extension specialists and researchers with regard to position, status, and level of formal training.

## EVALUATION CRITERIA

Lack of Relevant Evaluation Criteria - Traditionally, research has been geared towards an objective of increasing yield per unit area or per animal. There is often the implicit assumption that farmer motivation is cash oriented and that the farmer has reasonable access and control over available resources. This does not hold true for the average low-resource farmer in Botswana. Evaluation needs to be based on criteria relevant to goals adopted by and resources controlled by farm families. For example, in the Botswana situation the returns per unit of labor during "bottle-neck periods is likely to be more relevant than returns per unit area or per animal. Evaluation criteria different from yields per unit area can be difficult to incorporate satisfactorily into research program undertaken on experiment stations.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.

Life of Project: \_\_\_\_\_ to FY \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Data Prepared: \_\_\_\_\_

Project Title & Number: \_\_\_\_\_

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p> <p>Improve the welfare of small farmers and increase national production</p>	<p>Measures of Goal Achievement: (A-2)</p> <p>National grain production increases by 10%</p> <p>per capita income increases by 10%</p>	<p>(A-3)</p> <p>National trade figures</p> <p>Updated rural income distribution survey</p>	<p>Assumptions for achieving goal targets: (A-4)</p> <p>That income distribution continues to be a government objectives</p> <p>That there is no significant drop in rainfall</p>

From Project Paper, ATIP,  
633-0221, Sept. 16, 1981

ANNEX 11-A  
Page 1

ANNEX K

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PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project: \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared: \_\_\_\_\_

AID 1020-26 (1-72)  
SUPPLEMENT 1

Project Title & Number: \_\_\_\_\_

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose: (B-1)</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p>	<p>(B-3)</p>	<p>Assumptions for achieving purpose: (B-4)</p>
<p>To improve the capacity of the Ministry of Agriculture's research and extension programs to develop and effectively extend farming systems recommendations relevant to the needs of the small farmers in Botswana.</p> <p><u>Sub-purposes</u></p> <p>(a) Improve the capacity of the GOB's Ministry of Agriculture's Department of Agricultural Research (DAR) to develop technologies appropriate for small farmer needs.</p> <p>(b) To improve the capability of the extension service to transfer technologies which can be utilized by small farmers and strengthen and institutionalize the linkage between the research and extension departments + <i>between the Extension Department + farmers</i></p> <p>(c) To insure that adequate supplies of needed seed for major agricultural crops are available for distribution to Botswana farmers</p>	<p>New technological packages will have been developed and will be extended to Botswana farmers</p> <p>An FSR program will be on-going in Botswana (posts will have been localized for established positions).</p> <p>Research at the MOA's DAR will be structured to emphasize a commodity approach</p> <p>DAR will be emphasizing cereals and legume conducting this research along commodity lines. Most positions in these areas will be localized</p> <p>DAR will be responsive to the extension service and will be conducting trials based on request from field services</p> <p>The RELO position will be functioning effectively</p> <p>The extension service will have new technologies to disseminate</p> <p>BAMB's seed production unit will be producing and distributing 2000 metric tons of</p>	<p>Agricultural Field Service Records (particularly their annual report)</p> <p>Government establishment list and MOA's budget</p> <p>DAR organizational structure and staffing pattern</p> <p>DAR Annual Report</p> <p>DAR and DAS Annual Reports</p> <p>DAFS Annual Report</p>	<p>That sufficient flexibility exists in the system which will develop packages to increase productivity</p> <p>That research for small farmers is a high priority</p> <p>That the Extension Service continues to function effectively</p> <p>That research and extension work together cooperatively</p>

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PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared \_\_\_\_\_

Project Title & Number: \_\_\_\_\_

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <p>(a) Strategy will be developed for agricultural research emphasizing small farmers</p> <p>(b) New technologies will be tested in farmers' fields</p> <p>(c) New technologies will be tested at DAR whose ideas were initiated by FSR and extension</p> <p>(d) New technologies will be developed for dissemination</p> <p>(e) BAMB seed production unit will be completed and functioning</p>	<p>Magnitude of Outputs: (C-2)</p> <p>Research strategy will be developed</p> <p>100 new technologies will be tested in farmers fields</p> <p>50 new technological packages will be developed</p> <p>5 - 10 technological packages will be developed</p> <p>These new technological packages will be disseminated</p>	<p>(C-3)</p> <p>Review of strategy</p> <p>MOA records</p> <p>MOA records</p> <p>MOA records</p> <p>MOA records</p>	<p>Assumptions for achieving outputs: (C-4)</p> <p>That the GOB will develop a strategy</p> <p>That sufficient flexibility exists in the system to develop new technologies</p> <p>That DAR has the capacity to test technologies</p> <p>That DAR has the desire to respond to FSR requests</p> <p>That Agricultural Field Services has the capacity to extend new technologies</p>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project: \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U. S. Funding \_\_\_\_\_  
Date Prepared: \_\_\_\_\_

Project Title & Number: \_\_\_\_\_

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Inputs: (D-1)</p> <p>(a) <u>AID</u></p> <p>Technical Assistance Commodities Training</p>	<p>Implementation Target (Type and Quantity) (D-2)</p> <p>37.5 person years long term Seed equipment, agricultural inputs 55 person months of short term 96 person months of short term 22 person years long term</p>	<p>(D-3)</p> <p>AID records</p>	<p>Assumptions for providing inputs: (D-4)</p> <p>That funds are made available</p>
<p>(b) <u>GOB</u></p> <p>Counterparts Commodities Training</p>	<p>61 person years 16 vehicles 15 person years</p>	<p>GOB records</p>	<p>That funds are available</p>

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY 81 through FY 90  
Total U.S. Funding: \$9.18 million  
Date Prepared: 5/28/86  
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Project Number and Title: Agricultural Technology Improvement Project, 633-0221

<u>Narrative Summary</u>	<u>Objectively Verifiable Indicators</u>	<u>Means of Verification</u>	<u>Important Assumptions</u>
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>A-1. To assist the GOB in developing an agricultural system that provides relevant technology leading to increased productivity for Botswana farmers</p> <p>B-1. <u>Project Purpose:</u></p> <p>a) To improve the capacity of the Ministry of Agriculture's research and extension programs to develop and effectively extend improved technology and practices relevant to the needs of small farmers in selected pilot areas.</p> <p><u>Sub-Purposes</u></p> <p>a) Improve the capacity of the Ministry of Agriculture's Department of Agricultural Research (DAR) to develop technologies for small farmer needs.</p>	<p>Measure of Goal Achievement:</p> <p>A-2. Organizational changes made within MOA to institutionalize FSR system.</p> <p>Increased returns to labor and other inputs demonstrated.</p> <p>Increased crop production under specified rainfall conditions.</p> <p>B-2. Conditions that will indicate purpose has been achieved: <u>End-of-Project status</u></p> <p>a) The Ministry of Agriculture's DAR will be structured to participate more effectively in on-going FSR and ultimately to farmer's needs.</p> <p>1. On-station research at the DAR structured to use a commodity approach, emphasizing cereals and legumes.</p> <p>2. System established for DAR to respond to requests from extension teams and conduct trials based upon these requests.</p>	<p>A-3. MOA official papers/ correspondence</p> <p>Farm Surveys</p> <p>Farm surveys and meteorological data</p> <p>B-3.</p> <p>DAR's Annual Report and records.</p> <p>Records of meetings/workshops held with DAR/DAFS Staff.</p>	<p><u>Assumptions for achieving Goal Targets:</u></p> <p>A-4. Agricultural research and extension continue to be high priorities of GOB.</p> <p>The amount and distribution of rainfall is sufficient to enable production to occur.</p> <p>B-4. <u>Assumptions for achieving purpose:</u></p> <p>That potential exists in the agricultural system to improve productivity.</p> <p>That research for small farmers continues to be given high priority.</p>

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PROJECT DESIGN SUMMARY  
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Life of Project:  
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Project Title & Number: Agricultural Technology Improvement Project, 633-0221

<u>Narrative Summary</u>	<u>Objectively Verifiable Indicators</u>	<u>Means of Verification</u>	<u>Important Assumptions</u>
<u>Project Purpose:</u>	Conditions that will indicate purpose has been achieved: End-of-Project status		<u>Assumptions for achieving purpose:</u>
b) To improve the capability of the extension service to transfer appropriate technologies and strengthen the linkages between research extension and farmers.	b) Improved linkages will have developed between the MOA's Research, Extension and Planning Depts. resulting in more relevant adaptive technologies. 1. The RELO Position localized and functioning effectively. 2. DAFS disseminating tested technologies in the pilot areas. 3. Improved communication established between DAFS and farmers in pilot areas.	MOA staffing pattern and manpower training plans.  DAF and contractor records.  Records of meetings/ consultations between DAFS and farmers.	That the extension positions in the pilot area will be staffed and have sufficient time to engage in FSR related work.   That improved technologies can be identified, tested and available for extension.
c) To provide Botswana farmers in selected pilot areas with relevant innovations in agricultural production technology and methods through field trials, demonstration and farmer training.	c) Technologies identified which improve returns to labor/capital and/or increased production.	Project Records	

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<u>Narrative Summary</u>	<u>Objectively Verifiable Indicators</u>	<u>Means of Verification</u>	<u>Important Assumptions</u>
<u>C-1. Project Outcomes</u>	<u>C-2. Magnitude of Outputs:</u>	<u>C-3</u>	<u>C-4. Assumptions for achieving Outputs:</u>
1. Farming systems designed, developed and tested in 2 areas	1. a) Minimum of 2 teams installed and functioning. b) Alternative crop and livestock technologies tested on farmers' fields.	Project Records  Project Records	That the GOB will implement its current research strategy.  That potential exists in the system to improve new technologies.
2. Institutional capability and skills developed within MOA to carry out FSR in selected pilot areas.	2. a) Qualified staff developed in needed specialty areas, 20 persons trained at the M.S. and B.S. level. b) Organizational structure and systems established to integrate research and extension in order to adequately test the FSR approach. c) Assessment of FSR results concluded near the end of the project and plan prepared regarding the further institutionalization and expansion of FSR.	MOA Records  MOA Records  Project Records and GOB policy/planning documents	That DAR has the capacity to test technologies.  That DAR has the desire to respond to FSR requests for on-station trials.  That DAFS is willing to share responsibility for FS work and is adequately staffed to do so.

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<u>Narrative Summary</u>	<u>Objectively Verifiable Indicators</u>	<u>Means of Verification</u>	<u>Important Assumptions</u>
C-1. <u>Project Inputs:</u>	C-2. <u>Implementation Target (Type and Quantity)</u>	C-3	C-4. <u>Assumptions for providing Inputs:</u>
3. Necessary FSR support activities strengthened.	3. a) Seed Technology Unit strengthened and progress made on localization of all positions. b) Training Plan developed for crop production officers, and progress made on implementing the plan. c) On-station crop research programs on sorghum, millet and cowpeas established and progress made on variety selection, cultivation practices and disease/pest resistance.	MOA Records	Bean/Cowpea and Intsormil Projects will continue to receive the bulk of their training and T.A. support from centrally funded CRSP projects.
4. Research and information data base developed.	4. a) Research data collected on project is collated and analyzed. b) Technological and social/economic data is written up and future needs identified. c) A system is established for future data collection and analysis.	Project Records  Project Records  Project Records	That results of the FSR pilot activities are sufficiently promising to warrant adoption of FSR on National Scale.  That GOB will conduct an agricultural sector assessment which will include explicit recommendations on use of FSR approach.

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<u>Narrative Summary</u>	<u>Objectively Verifiable Indicators</u>	<u>Means of Verification</u>	<u>Important Assumptions</u>
<p>D-1. <u>Project Inputs:</u></p> <p>(a) <u>AID</u></p> <p>Technical Assistance</p> <p>Training</p> <p>Commodities/Other</p> <p>(b) <u>GOB</u></p> <p>Counterparts</p> <p>Commodities</p> <p>Training</p>	<p>D-2. <u>Implementation Target (Type and Quantity)</u></p> <p>52 person years long-term 37 person months of short-term consultancies</p> <p>40 person months of short-term training 44 person months of long-term training</p> <p>61 person years 5 vehicles 15 person years</p>	<p>D-3</p> <p>AID Records</p> <p>GOB Records</p>	<p>D-4. <u>Assumptions for providing Inputs:</u></p> <p>That funds are made available from bilateral and supporting centrally funded sources.</p> <p>That funds are available.</p>