PP-BAD494

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

OFFICIAL PROJECT DOCUMENT

1. TRANSACTION CODE: C (A = Add, C = Change, D = Delete) — Amendment Number: 1 — DOCUMENT CODE: 3

2. COUNTRY/ENTITY: BURUNDI

3. PROJECT NUMBER: 695-0106

4. BUREAU/OFFICE: AFR / 06

5. PROJECT TITLE (maximum 40 characters): SMALL FARMING SYSTEMS RESEARCH

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 10 DD 30 YY 89

7. ESTIMATED DATE OF OBLIGATION (Under "B." below, enter 1, 2, 3, or 4): A. Initial FY 83 B. Quarter 3 C. Final FY 85

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

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. Total	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. Total
AID Appropriated Total	920	1,371	2,291	4,252	3,538	7,790
(Grant)	(920)	(1,371)	(2,291)	(4,252)	(3,538)	(7,790)
(Loan)	(-)	(-)	(-)	(-)	(-)	(-)
Other U.S. 1.						
Other U.S. 2.						
Host Country		543	543		1,546	1,546
Other Donor(s)						
TOTALS	920	1,914	2,834	4,252	5,084	9,336

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	C. PRIMARY TECH. CODE 2. Loan	D. OBLIGATIONS TO DATE 1. Grant	D. OBLIGATIONS TO DATE 2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	E. AMOUNT APPROVED THIS ACTION 2. Loan	F. LIFE OF PROJECT 1. Grant	F. LIFE OF PROJECT 2. Loan
(1) FN	211 B	070		-	-	2,291	-	7,790	-
(2)		080							
(3)		020							
(4)									
TOTALS						2,291	-	7,790	-

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 073 | 074 | 012 | 967 | 968 |

11. SECONDARY PURPOSE CODE: 221

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

A. Code	BSW	R/AG	XII	TNG	TECH		
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

a. To strengthen GRB institutional linkages between agricultural research and extension organizations and the farming community, and to upgrade professional skills of Ministry of Agriculture and Livestock's research and extension staff.
b. To provide the farmers of Burundi with relevant innovations in agricultural production technology and methods through farmer training, field trials and demonstrations.

14. SCHEDULED EVALUATIONS: Interim MM 06 YY 85 | MM 04 YY 84 | Final MM 06 YY 88

15. SOURCE/ORIGIN OF GOODS AND SERVICES: [X] 000 [X] 941 [X] Local [ ] Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a 46 page PP Amendment) revision

This is a revision of the Project Paper submitted to AID/W on 3 December 1981.

OFFICIAL PROJECT DOCUMENT

17. APPROVED BY — Signature — Title: AID Affairs Officer, Burundi — Date Signed: MM 02 DD 25 YY 83

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1330-4 (8-79)

PROJECT AUTHORIZATION

Name of Country: Burundi
Name of Project: Burundi Small Farming Systems Research
Number of Project: 695-0106

1. Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Small Farming Systems Research Project (the "Project") for the Republic of Burundi (the "Cooperating Country") involving planned obligations of not to exceed Seven Million Seven Hundred Ninety Thousand United States Dollars ($7,790,000) in grant funds over a six and one half years (6 1/2) period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing certain foreign exchange and local currency costs for the Project.

2. The Project will provide assistance to the Ministry of Agriculture and Livestock to strengthen the institutional linkages between agricultural research and extension organizations and the farming community and to upgrade the professional skills of the Ministry of Agriculture and Livestock's research and extension staffs, through farmer training, field trials and demonstrations. The Project will finance technical assistance, training, commodities, construction and associated support costs. The project will be implemented in three phases: a year of preliminary buildup, nearly four and a half years of implementation, and a year for completion of training for the last participants.

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

a. Source and Origin of Commodities and Nationality of Services

Goods and services, except for ocean shipping, financed by A.I.D. under the Project shall have their source and origin in the Cooperating Country or in Countries included in A.I.D. Geographic Code 941 except as A.I.D. may otherwise agree in writing. Suppliers of commodities or services shall have the Cooperating Country or Countries in A.I.D. Geographic Code 941 as their place of nationality, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the Project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States or of the Cooperating Country.

12

b. Conditions Precedent

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

(1) furnish evidence that suitable sites have been selected and land provided for construction and field testing plots at Murongwe and Karuzi;

(2) provide appropriate plans, specifications, cost estimates, and time schedules for construction; and

(3) provide A.I.D. with a current list of pesticides and herbicides being used by the Cooperating Country Agricultural Research Institution (ISABU) in its trials both at experimental stations and on farmers' fields. Information to be furnished should include genetic names, manufacturers' environmental data, recommended tolerances and rate and frequency of application.

c. Covenants

The Cooperating Country shall covenant in substance as follows:

(1) to provide appropriate supporting professional personnel on a timely basis;

(2) that housing constructed under the Project shall be used exclusively by A.I.D.-financed advisors in this or subsequent projects until or unless A.I.D. otherwise agrees in writing. In addition, the GRB will rebuild and renovate buildings at Karuzi for project use.

(3) to make available qualified candidates for long term academic training in the U.S. and to insure by bonding or other means that these persons are assigned to the same or other suitable positions as may be mutually agreed upon between the parties within the Cooperating Country's Ministry of Agriculture and Livestock for a period equal to at least twice the period of training financed under the Project. In addition, all participants for non degree programs of 18 months or less and M.Sc. participants already working for the GRB will receive salaries and benefits to support their families in Burundi while they are receiving training abroad.

(4) that all equipment, including vehicles, procured under the Project will be used exclusively for Project activities, and that the use of all vehicles, excluding motorcycles, will be under the direction and supervision of the U.S. Team Leader and the Ministry of Agriculture's Director of Agriculture, or their respective designees.

d. Waivers

(1) Based on the justification set forth in Annex L, I hereby approve an origin waiver from A.I.D. Geographic Code 000 (United States) to Code 935 (Special Free World) in the estimated amount set forth in the Annex to permit the purchase of Project vehicles as set forth in the Annex. I hereby certify with respect to these vehicle procurements, that (i) special circumstances exist

to waive and hereby waive the requirements of Section 636(i) of the Act, and (ii) that exclusion of procurement from Free World sources other than the Cooperating Country and Countries included in Code 935 would seriously impede attainment of U.S. foreign policy objectives and objectives of the Foreign Assistance program.

(2) Based upon the discussion in Part IV of the Project Paper, I hereby approve a waiver of the requirement of Section 110(a) of the Act, that the Cooperating Country provide at least twenty-five percent (25 percent) of the costs of the Project with respect to which assistance is being furnished. This requirement is waived in accordance with Section 124(d) of the Foreign Assistance Act.

Signature _____

_____
Authorizing Officer

_____
Office Symbol

BURUNDI SMALL FARMING SYSTEMS RESEARCH
(695-0106)

TABLE OF CONTENTS

ANNEXE

PROJECT PAPER

BURUNDI SMALL FARMING SYSTEMS RESEARCH

I. BACKGROUND

A. AGRICULTURE AND THE NATIONAL ECONOMY

Burundi is one of the poorest of the world's developing countries. Its average per capita income is about $190 per year. More than 90 percent of its population lives on small farms averaging slightly more than one hectare in size. Subsistence agriculture accounts for more than 50 percent of GDP, while cash crops provide an additional eight percent. Burundi has the second highest population density of any country in Africa (after Rwanda), declining food production, deteriorating soil quality, and a high rate of population growth (estimated as being as high as 2.7 percent).

Under these conditions, existing agricultural practices are inadequate to meet the population's food and cash needs. The average diet has deteriorated in both quantity and quality, so that it is less than the FAO minimum caloric requirements as well as being seriously deficient in animal proteins and fats. Burundi does, however, have responsive soils, good rainfall distribution, and a healthy highland climate. Since it has a favorable natural environment, it should be possible to increase food crop yields at reasonable costs.

In Burundi, agricultural development is the most immediate and essential requisite to growth of the national economy and improvement of the welfare of the majority of the population. There is an urgent need to find means of increasing agricultural productivity on the limited land available. This will require substantial improvements in soil fertility through such things as improved cultural practices, more effective cropping systems, use of fertilizer, agro-forestry and livestock production of all types. Indeed, one of the most serious constraints to increased agricultural production in Burundi is the dearth of applied agricultural research directed specifically at increasing soil fertility on small farms. Other constraints, such as extension and input supply, could be addressed more advantageously once research develops improved technologies that are acceptable to farmers.

B. GRB PRIORITIES

The Burundi Government's Third Five Year Plan (1978-1982) lists as one of its top five priorities an emphasis on agricultural production, particularly food crop production. Until recently, agriculture represented a relatively small percentage of Burundi's "ordinary" or recurrent operating expenses budget but that had risen to 4.1 percent by 1981. Most expenditures supported cash crop production. Inadequate allocation of government resources to agricultural extension, infrastructure and provision of production inputs have contributed to the subsistence sector's poor performance, as have insufficient incentives to farmers and to lower level civil servants responsible for implementing the development of the agricultural sector.

In the Third Five Year Plan, however, about 22 percent of total investment in the "extraordinary" budget's development programs and programs financed by donors will be allocated directly to the agricultural sector. An additional 35 percent will finance related infrastructure (e.g. rural housing, water supply, roads, etc.). Although the GRB has fallen behind plan projections, annual Extraordinary Budget expenditures on agriculture increased from FBu 33.5 million in 1975 to FBu 655.3 million in 1981. Since many donor financed activities are not covered in the extraordinary budget, this figure underestimates expenditure on investment in agriculture in the public sector. Projects focus on improving food crop production, soil conservation, improved animal husbandry and reforestation. Production of cereals (maize, rice, wheat), leguminous plants (beans and peas), fruits, vegetables and particularly oleaginous plants (palm oil, soya, peanuts) will increase under programs set forth in the Plan.

The GRB recognizes the deficiencies in its agricultural research program which are hindering achievement of its food production objectives. A recent GRB presentation to the UNCTAD conference for the least developed countries in September 1981 called attention to the "weakness of agronomic research and most particularly the difficulties of extending the results". Despite efforts to address this weakness by ISABU, the organization responsible for most agricultural research in Burundi, much remains to be done to assure that technologies and cultural practices recommended by researchers are consistent with farm level agricultural, social and economic realities.

C. RELATIONSHIP TO CDSS AND AID DEVELOPMENT STRATEGIES

AID's Food Sector Assistance strategy for sub-Saharan Africa gives priority to planning and policy analysis, increasing farmer participation in decision making and building institutions - research, extension, training - which provide appropriate technology, information and inputs for increasing productivity in agriculture. The draft Africa Bureau Agriculture Research Strategy emphasizes the need for adaptive research which focuses on the farm as a production/consumption unit. It supports a farming systems approach for forging stronger links between research, extension and the farmer.

USAID/Burundi's primary strategy objective in the country's food production sector, as outlined in the 1983 CDSS, concentrates on improving food availability for the rural poor in the context of limited land resources. This will require use of more intensive yet relevant production technologies from applied agricultural research, reliable supplies of quality seeds and other agricultural inputs, appropriately trained extension staff, farm to market roads, and improved food storage and marketing capabilities.

The CDSS notes the current lack of farming systems research and envisions this project as a sine qua non for providing the new technologies necessary for an effective agricultural extension program. It sees the Small Farming Systems Research Project as setting the direction for AID projects in the food sector for the next several years. The CDSS also calls attention to the limited availability of trained personnel. This project addresses all three of these key areas by providing an integrated approach to agricultural training, research and extension.

D. AGRICULTURAL RESEARCH AND EXTENSION: STRUCTURE AND PROBLEMS

The Burundi Ministry of Agriculture and Livestock (MOAL) has two divisions responsible for generating improved technology and diffusing it to farmers. The Development of new technology in the form of improved varieties and agricultural practices is the responsibility of the research institution, Institut des Sciences Agronomiques du Burundi (ISABU). Transfer and application of these technologies, including soil conservation, are the responsibility of the Department of Agronomy or extension service.

1. Research

ISABU has done some food crop research (cereals/legumes/tubers) beginning six years ago and has increased it during the past two years. ISABU has about 24 expatriates (mostly financed by Belgian assistance) and 20 Burundian engineer level technicians working on agricultural research. A manpower pool of this size offers good potential to support this small farm research project.

ISABU experimental agricultural research emphasizes variety testing and seed selection and multiplication. This has involved the selection of improved varieties and improved seed multiplication practices. Little research is conducted on practices, fertility and crop rotation trials. Major food crops being investigated include dry beans and peas, cassava, sorghum wheat, triticale, maize and sweet potatoes. A major weakness of current research, however, is the lack of ability to transfer experimental results from research stations to small farms and lack of work done under conditions similar to those actually existing on small-scale farms. Those problems are interrelated.

In general, ISABU's crop research does not take into account labor and cash constraints of rural families, nor is there any testing of the performance of various crop mixtures or intercropping combinations which are commonly used. For example, farmers did not readily accept a recently released

maize variety because it is a late maturing variety. Most experiments use mechanized soil preparation and inputs such as inorganic fertilizers and plant protection chemicals which very few farmers can afford. Agricultural research in Burundi has not yet developed any proven low cash, low risk food crop technology developed specifically for the small-scale farmer (although some suitable varieties of wheat, triticale, and other crops have been tested on research stations and released to farmers). Most foreign donor research projects have benefited cash crop farmers and livestock producers, while neglecting the large majority of subsistence food crop producers.

Agricultural research in Burundi is complicated by the fact that the country has four major ecological regions and eleven zones, each with its own cropping system and each requiring adaptation of specific crop varieties suitable to the ecological conditions (See Annex E).

2. Extension

In addition, major problems in the extension service impede agricultural development in Burundi. Part of the problem consists of availability of suitable tested varieties and techniques to extend, as discussed above, but others include low level of training and supervision and lack of transport, equipment and logistical support necessary for effective extension work.

The extension service is staffed at the colline, commune, provincial and national levels of the GRB structure. The general extension staff outside crop and area specific programs consists of about six B.S. level agronomists, 49 agronomists with four years of post BEAC level agriculture training assigned at the commune level, 228 agronomic and extension assistants with one year of secondary school level agriculture training work at the zone level and 3,200 monitors work at the farm level. Monitors have had only a primary education plus two months of in-service agricultural training. The monitors represent the most direct link with farmers. The extension organization is somewhat fragmented. In addition to the "regular" MOAL extension service in the Department of Agronomy, there are a number of extension activities which are components of donor aided development projects.

The in-service training being provided for extension workers at the commune and zone level is usually a one week session held once each year. Course materials deal primarily with agricultural production technologies. The farm-level extension worker (monitor) participates in an in-service training program once every two years. There is no subject matter staff in the extension service, hence the project staff must depend on the research staff for technical support.

E. RELATED OTHER DONOR PROJECTS

1. IBRD/IDA

a. Kirimiro

The World Bank will soon begin a large integrated rural development project in the Kirimiro region in Muramvya and Gitega Provinces.

This six-year project is a wide ranging one, quite different in purpose and scope from the SFSR project. The World Bank project includes improvements in roads, water and health services infrastructure, agricultural extension, provision of farm inputs, soil conservation, afforestation, supply of seedlings to farmers, coffee washing stations and hand pulping centers. It covers the five westernmost communes in Gitega Province and an adjacent commune in Muramvya Province. All of these are in coffee growing areas below approximately 1,500 to 1,900 meters in altitude. Several studies included in the World Bank project (such as those on production data and small farmer constraints) can supplement the work of AID's SFSR project. Total life of project cost is estimated at $21.4 million, and IDA will finance $19.3 million.

With appropriate coordination between the World Bank and AID project teams and the GRB, these two projects should complement each other effectively, and there is no evidence of unnecessary duplication between them. The overall emphasis of the World Bank project is on coffee production, whereas the SFSR project focuses on applied research on food crop production systems.

b. Ngozi III

The IBRD is the lead donor for the IDA/IFAD five year integrated rural development project in Ngozi province. Covering the entire province, the project aims at assisting 150,000 smallholders in augmenting the productivity of their foodcrop and coffee cultivation by additional training for extension workers and building more coffee washing stations, also addresses rural living conditions by building or maintaining water sources, equipping social centers, developing firewood resources and improving the road network. This effort, including GRB, IDA and IFAD, totals US$28.9 million.

Like the IBRD project in Kirimiro region, the Ngozi III project seeks to improve and expand the capabilities of existing institutions. The project's agricultural priority is increased coffee and food crop production but with a different focus than the SFSR project. SFSR's research and improved training methods for extension workers can complement and increase the overall impact of the Ngozi III project, which is located just to the north of the Murongwe research center.

2. Food and Agriculture Organization

The FAO is planning a national agricultural census to collect statistics on such things as land use, areas under certain crops, and livestock production. The FAO plans to work with the Department of Agronomy in conducting a large national sample survey.

The FAO has also run a fertilizer demonstration trial program for several years. Thus far the observable spread effects appear to be very slight, but fertilizer supplies in Burundi have been very limited, and what is available is used on cash crops.

3. Belgian Technical Assistance to ISABU

ISABU receives substantial technical assistance from Belgium. Twenty three technicians are funded by Belgium and one funded by Canadian technical assistance. These technicians work with some 78 Burundian most of whom are trained to the technical assistant level with less than 20 having had engineer level training.

These Belgian technical personnel form the nucleus of the nine technical Departments of ISABU as follows:

	Department or Division
3	Food Crops Division
2	Industrial Crops Division
1	Agrostology
3	Plant Protection
6	Soil Science and Agri-Chemistry
1	Animal Husbandry
3	Rural Sociology and Economics
1	Biometry and Genetics
1	Forestry
21	

In addition there is one technical advisor to the Director General of ISABU and one administrative coordinator for a total complement of 23 Belgian expatriates, as discussed in Annex E - Technical Analysis. A decade ago assistance in research was almost entirely on cash or export crops, the emphasis is now placed on food crops.

II. PROJECT DESCRIPTION

A. INTRODUCTION

The Small Farming Systems Research project addresses one of the most basic of Burundi's agricultural problems: the relatively low productivity of the small farmer. This project is envisioned (assuming the GRB and AID are in agreement and funds are available) as the first in a series of interrelated projects on applied agriculture research, extension and production, centered especially on the central plateau region. It will take about ten to 15 years to develop the institutions concerned to full maturity. The SFSR project will reinforce the shift toward food crops in existing research programs. In addition, it seeks to improve the effectiveness of food crop research in Burundi by strengthening operational linkages between research and extension and eliciting the participation of farmers in the research process. This approach is expected to lead to a greater emphasis on developing and testing new crop varieties and production methods under conditions more closely reflecting those of the average small farmer. As a consequence, it should promote the acceptance of relevant research results by farmers and lead to more rapid increases in agricultural production.

B. SUMMARY OF GOAL, PURPOSE AND OUTPUTS

1. The Long-Term Development Goal served by the project is to assist the Government of Burundi (GRB) in developing agricultural institutions that provide relevant technology leading to improved nutrition and welfare of small farmers.

2. The Dual Purposes of the Project are:

a. To strengthen the GRB institutional linkages between the agricultural research and extension organizations and the farming community, and to upgrade the professional skills of the Ministry of Agriculture and Livestock's research and extension staff.

b. To provide the farmers of Burundi with relevant innovations in agricultural production technology and methods through farmer training, field trials and demonstrations.

3. The Specific Outputs of the Project are:

a. Better trained agricultural technicians, including:

-- 5 agronomists
-- 2 agricultural economists
-- 2 microbiologists
-- 3 extension specialists
-- 4 lower level agricultural technicians
-- 240 extension agents at all levels
-- 8-10 other ISABU researchers.

b. Mechanism established to provide two-way communication between farmers and research/extension workers.

The project will establish a Farming Systems Research and Extension Department at ISABU to be responsible for the work of Adaptive Research Teams (ART)*. The ART's which work at the commune level, have three members, an agronomist, a social scientist and an extension officer. They will include an extension specialist seconded from the Agronomy Department of the Ministry of Agriculture. They will provide a means of collecting from farmers information about specific problems and potential improvements in local farming systems. The extension specialist on the ARTs will provide the focal point of this linkage, through the ART's, farmers, researchers, and extension workers together will identify problems and potential innovations for resolving them. They will then work together to test and modify, as necessary experimental trials of proposed innovations. Innovations found to be successful will be widely disseminated by the extension service.

c. Methodology established for collecting farm level agricultural information and farming systems data.

The ART's will use both informal and formal methods for collecting data on farmer problems, input-output relationships and other

* The composition, methodology and course of action of the ART's are found in Annex E pp 1 to 3.

aspects of the farming systems found useful in guiding research efforts. Demonstrating precisely what types of data on existing farming systems need to be collected, how these data can be collected, and how they can later be used to establish priorities for agricultural research will constitute an important project output.

d. Improved capacity of ISABU to conduct research directly applicable to small farms.

This will result from outputs a to c above as well as from the more dependable supply of operating inputs provided by the project. The small research grants will provide another source of information that should better guide the work of researchers.

e. Strengthened outreach capacity of the extension service in the Project communes with methodology established for replication elsewhere.

This will result from improved logistical support and training of both extension workers and farmers as well as experimentation with extension management systems that are effective under conditions of some limited operating support. More closely integrating the extension and research activities should also improve the prestige and motivation of extension agents.

f. Greater acceptability by small farmers of ISABU research results.

This should result from outputs a through e above as well as from training of individual farmers through 1-2 day special programs directed at specific problems faced by farmers in a particular area.

g. Improved capacity to produce high quality seed for distribution to farmers.

The project supplies equipment and land for the multiplication of improved seeds developed for the central plateau ecological zone.

C. PROJECT RESOURCES

The project will be implemented through the joint efforts of a U.S. technical assistance team and designated ISABU and Department of Agronomy officials who will work closely with participating farmers in the two communes.

1. USAID Contribution

a. Technical Assistance:

The project provides a four member U.S. technical assistance team that includes a research agronomist, an agricultural economist, an extension specialist and an operations/logistics specialist. It is anticipated that this team will be provided by a major U.S. Land Grant University under Title XII that will take responsibility for project implementation.

Housed at Karuzi research station once construction is finished, the three team technicians will devote the main share of their time to work at the project sites. In addition to project activities described in the next section, they will plan and undertake the training of Barundi counterparts in farming systems research methods. The administrative specialist will handle administrative matters, largely relieving the technical staff from this time-consuming burden. This person will be housed in Bujumbura. The senior technical person will be designated U.S. team leader and will serve as the team's point of contact with the GRB. (The technical analysis discusses the functions of the U.S. Advisors. Full job descriptions are attached as Annex K-3).

In addition to long-term advisors the project provides 44 person/months of short-term specialists to work in such areas as soil conservation, agricultural training, microbiology, seed processing, small animal husbandry and project evaluation. Programming for short term assistance will be flexible, depending on the needs of both U.S. and Barundi project personnel. The project budget in Annex K details a tentative list of short term consultants and the estimated period of service required for each.

b. Training:

The project training activities occur at several different levels.

Long-term Training - Two engineer/agronomist level agricultural technicians, two graduates of the faculty of economics and three graduates of the faculty of science will receive M.Sc. degree training in the U.S. and Africa in agronomy, agricultural economics, extension and soil microbiology. All M.Sc. degree trainees will be required to pursue thesis degree programs and to write their thesis in Burundi on a topic relating to ISABU's research program.

In addition to degree training, three engineer level agriculturalists, one university graduate in economics and five post-secondary school level trained agricultural technicians will receive medium term, non-degree training in similar technical specialities as well as in animal husbandry. The question of providing B.Sc. level training of the post secondary technicians has been debated at length. At least three years training would be required in the U.S. and there is a language problem. The Faculty of Agronomy should increase its enrollment and the new Higher Technical Institute will provide B.Sc. training in country. The GRB law at present requires individuals receiving training of more than 18 months must resign civil service positions, and lose all benefits and chances of family support. We are trying to obtain an exception in the case of M.Sc. training. Given the broad basis of the engineer type program as well as that of the post secondary institutions, it was felt that specialization of training would be the best use of Burundi's scarce human resources. In all, the project will provide 17 person years of M.Sc. training for seven persons and 14 years of non-degree training for another nine persons. The table on the next page summarizes the long term training provided by the project, the expected level of previous training of the trainees and their anticipated assignment at the completion of the first phase of the project.

SUMMARY OF LONGER TERM TRAINING PROVIDED BY THE SMALL FARMING SYSTEMS RESEARCH PROJECT

Project Training	Previous Training	Suggested Location of Training	Years of Training	End of Project Assignment
M.Sc.				
Soil Fertility	L. Sci.	N. Carolina	2.5	ISABU
Edible Legumes Production	L.Sci.	Nigeria/IITA	2.5	ART
Soil Microbiology	I. Ag.	U.S./IITA	2.5	ISABU
Soil Microbiology	L.Sci.	U.S./IITA	2.5	ISABU
Ag. Economics	I. Ag.	U.S.	2	ART
Ag. Economics	L. Econ.	Nigeria	2.5	MOAL
Extension/Communication	L. Econ.	U.S.	2.5	ART
Non-Degree				
Maize Production	I. Ag.	U.S.	1.5	ART
Soil Fertility	ITAB	Cameroon	1.5	MOAL
Roots and Tubers Production	I. Ag.	Nigeria/IITA	1.5	ISABU
Legumes Production	ITAB	Africa	1.5	MOAL
Ag. Economics	ITAB	Cameroon	1.5	ART
Extension/Communication	L. Econ.	U.S.	2	MOAL
Extension/Communication	ITAB	Africa	1.5	ART
Small Farm Animal Production	ITAB	Kenya/ILCA	1.5	ISABU
Small Farm Animal Production	I. Ag.	Kenya/ILCA	1.5	MOAL
			31	

The technical analysis provides justification for the project's approach to training and Annex K gives details of the phasing of both long-term training and project staffing.

Short-Term Training - CIMMYT, CIMMYT/EA, IITA, CIAT, CIP, ICRISAT and other international research centers offer practical three to six month courses covering such subjects as farming systems research, specialized crop production and research and extension administration. The project will sponsor approximately nine GRB officials for such studies. This component could also finance study teams to other African countries or elsewhere.

In-Service Training - The project will conduct an in-service training program for research assistants and field extension officers in the form of week-long or shorter courses, workshops and seminars. It will also offer participating farmers in the two project communes a series of one-day training sessions relating to production problems or crop variety reviews.

c. Construction of Facilities:

AID-financed construction will be limited to facilities in direct support of technical assistance and training components of the project. These include:

16

(1) A guest house at Murongwe and possibly one at Karuzi to house the U.S. team, short term consultants and other ISABU researchers when resident in the field.

(2) Three 3-bedroomed houses at the Karuzi station for the U.S. technical team members. In the event one of the team members desire to reside in Bujumbura to permit school attendance, or for other reasons crucial to recruiting a competent technician, the third house will serve as a guest house. In that case the guest house planned for Karuzi would not be built. At least two of the technical assistance team members will be expected to reside on station at Karuzi.

(3) A training center at Murongwe to provide a focal point for the in-service training program (Karuzi site will use existing school facilities for training).

(4) A dormitory facility at Murongwe capable of housing up to 25 trainees.

(5) A small guest house/dormitory for visiting instructors at the Karuzi station. An acceptable facility already exists at Murongwe.

The Implementation Plan (Section V) includes a full discussion of project construction.

d. Commodities:

AID will finance various types of commodities totalling $298,000 in direct support of work at the two commune sites. The Financial Annex contains a detailed list of items to be purchased. These include:

-- project vehicles, motorcycles and bicycles;
-- equipment and instruments for field work;
-- seed equipment;
-- office equipment for U.S. team; and
-- furnishings for U.S. team houses and field guest quarters.

e. Operating Costs:

Project success will depend in an important way on the effective mobility and financial autonomy of the technical assistance team and the discipline of the field survey team. The lengthy delays in project implementation so typical of development projects in Burundi arise from shortages of fuel, fertilizer and other inputs as well as from delays in making counterpart contributions. These problems will only get worse in the Karuzi area as the development of the new regional headquarters there will strain available infrastructure over the medium term. For this reason the project envisions carrying all recurrent costs other than salaries, wages and utilities associated with operating the Karuzi station, as well as the salaries of the field survey teams during the first phase of the project. At the Murongwe station, similar operating costs associated with experimental activities of the ART's will be covered. Over the life of the project AID will finance recurrent costs totalling $611,000 for the following items (See the Financial Plan in Section IV for details):

-- expendable supplies;
-- salaries of local hire direct support staff for the TA team;
-- temporary housing and office rental for the U.S. team;
-- maintenance and fuel for project vehicles;
-- field survey team salaries and support; and
-- a crop insurance fund.

In the second phase of the project, should one be approved, vehicle operating, field survey team and expandable supply costs will be entirely shifted to the Burundi Government since staffing increments will be less and Karuzi will be a more developed town. Other recurrent costs will largely disappear when the expatriates leave.

f. Crop Insurance Fund:

Though ISABU accepts the approach to agricultural research that underlines this project there is, nonetheless considerable fear of the impact on farmers of moving too hastily to carry research experiments to farmers fields. Given the small size of farms in the project area, the risk of a crop failure will make many average and below average farmers hesitant to participate in on-farm trials. For this reason, the project provides a small crop insurance fund to compensate farmers who experience below normal production on trial plots due to the nature of the experiments. The technical assistance team, in conjunction with the extension service, will experiment with alternative approaches to providing crop insurance so as to avoid biasing the results of the on-farm trials. Criteria will be set forth in a PIL outlining the procedures for use of the insurance funds.

g. Research Grants:

The project will make special study grants available to the Faculty and/or students of the University of Burundi for joint surveys related to technical and socio-economic aspects of the project. In addition, it will provide individual grants to American, Barundi and possibly other African graduate students to conduct special studies related to agricultural research, as approved by the GRB project coordinator and the U.S. team leader. Grants would be modest and would cover such costs as travel, living allowances, purchase of books and materials, hiring of enumerators for data collection, etc. Detailed procedures will be established in PIL's. Normally, grants will be limited to less than $2,000 per proposal, and work should be completed within six months.

2. GRB Contribution

The GRB support to the project will mainly take the form of technical services, new construction, facilities and land provided in kind, and salaries for support staff and field workers. The total value of the GRB resources provided to the project amounts to $1,546,000 or 17 percent of total project costs. The Financial Plan in Section IV details the GRB contribution.

D. COURSE OF ACTION AND PROJECT ACTIVITIES

The project will establish a Department of Farming Systems Research and Extension within ISABU and initiate a farming systems research and extension program in two communes in Burundi's densely settled central plateau region. This area is ecologically representative of about 35 percent of Burundi's total land area and contains half of its population. Project results will therefore be applicable to much of the country. In addition, ISABU research programs in other ecological zones will benefit from the field trials and agricultural research procedures developed in these two communes. Once the project demonstrates successful results, the farming systems approach will be adopted by other ISABU research programs, probably during a second phase of this project.

The project will begin field work at Murongwe Research Center in Mutaho Commune and, after 12 months add a second location at Karuzi in Buyanguzi Commune. Karuzi is the site of two agricultural schools, a government farm, a small seed farm for food crops and coffee, and a livestock production facility. ISABU will begin developing a research station there as part of this project. (See discussions of project site in Technical Analysis Summary and Annex and in Social Soundness Analysis).

Project activities will involve agricultural research, crop trials on experiment station research centers and farmers fields, production of improved seed on a modest scale, introduction of new technologies and experimentation with agricultural extension. A U.S. contract team composed of a research agronomist, an extension specialist, an agricultural economist and an operations/logistics specialist will assist with project implementation. (The role of each of these specialists is discussed in the Technical Analysis). The U.S. team will collaborate with GRB counterparts from ISABU and the Department of Agronomy, as well as extension agents and participating farmers.

A key feature of the project, and one upon which its success will depend, involves institutionalizing direct connections among three groups -- agricultural research (ISABU); extension (Department of Agronomy); and farmers. Together these three groups will form an adaptive research team (ART) responsible for:

1. diagnosing areas of potential improvement in existing farming practices;
2. designing field trials both on and off the experiment station to test the compatibility of potential innovations with key features of the existing farming system;
3. evaluating the results of such field trials to determine the probable success or failure of wider dissemination of proposed innovations;
4. designing new field trials and experiments on the basis of what is learned in stages 1-3 above; and
5. disseminating successful innovations or technology to the farming community.

The project will follow CIMMYT tested diagnostic procedures which are discussed in the Technical Analysis section. Innovations found to increase productivity but to be incompatible with the existing farming system will be modified so as to make them compatible, or else they will be discarded. Successful innovations will be made a part of the extension program for demonstration and dissemination to farmers. Examples of possible innovations for testing include shorter maturing crop varieties; rhizobium innoculation of legumes to induce nitrogen fixation; and changes in crop rotation, plant spacing or intercropping practices. Many of these innovations will require research on ISABU research stations and centres prior to testing on farmers' fields.

In order to make agricultural research directly applicable to existing conditions on small farms, researchers and members of adaptive research teams will jointly be involved in both research design and evaluation of results. This will require that the ART's undertake both informal explorative or diagnostic surveys as well as formal sample surveys in order to identify constraints on production and ways of alleviating them which are acceptable to farmers. The ART's and researchers will then design trials to test the usefulness of the new technologies under farm level conditions. Once these trials reach the stage of on-farm testing the ART will closely monitor the on-farm experiments throughout the crop cycle by means of frequent visits to farmers by the extension agent, agricultural economist, research agronomist, and extension specialist. Each of these individuals will question farmers for information concerning suitability of specific innovations for wider diffusion.

The first field trials off the experiment stations will take place on the fields of about 8-10 farmers chosen by the U.S. technicians and the Adaptive Research Team. These farmers will probably be better off than average and thus able to risk the small amount of labor and land required for the trials. (The project provides a modest crop insurance fund to indemnify participating farmers against crop losses arising from the experiments but this is not likely to provide much assurance to the poorer farmers until they have seen successful results elsewhere). Once these early trials have been evaluated, and, if necessary, redesigned and redone until they show promising results under actual farm conditions, the technology will be extended to a larger and more random sample of 70-100 farmers in each commune. The ART will closely monitor the trial results of this sample of farmers for at least one growing season. Seed multiplication, if relevant, and wider dissemination of innovations which successfully pass the farmer testing stage will then follow.

In this respect, coordination with the AID-assisted Basic Food Crops Project (695-0101) is important so that, wherever possible, those facilities can be used for larger scale seed multiplication. At this time it is not known to what extent the sizable difference in altitude, soils and rainfall patterns between Karuzi and Kajondi will constrain seed production activities at one location or the other. The ART's will also conduct local trials of improved seed produced at Kajondi to test their suitability in the project area.

This project covers an initial period of slightly more than five years although the last participants will not return until six and a half years after project authorization. It is being implemented in conjunction with a GRB

effort to develop a medium altitude research station at Karuzi that can address the problems of farmers on the central plateau. Given the long-term nature of agricultural research and institution building, the mission has informed the GRB that it can expect a second phase of support if initial results are promising, both parties are in agreement, and funds are available. In that phase it will provide additional resources for strengthening on station research in such areas as livestock/crop interactions, nitrogen fixation, crop rotation systems and other complex areas where little inventory exists for on-farm adaptation and testing. The training program for this first phase anticipates a major increase in such research during a potential second phase.

Because of current efforts to move the administrative center for several Ministries to Gitega, the only town of any size with easy access to both the Murongwe and Karuzi project sites, temporary housing there is very difficult to find. For this reason, and because of shipping delays that plague development projects in Burundi, only the operations/logistics specialist will arrive in country at the beginning of the project year one. He will help provide administrative oversight of housing construction at Karuzi and make arrangements to ship commodities into Burundi. The other team members will then arrive at the beginning of year two ready to begin work and, we hope, with a structure already in place at ISABU to receive them. This will reduce costly delays which often handicap project success.

The following illustrates the sequence of activities which will occur in each year of the project:

First Year

-- Arrival of Operation/Logistics specialist.
-- Secure office and housing facilities for same.
-- Initiate construction of housing at Karuzi and training centers and guest house at Murongwe.
-- Order equipment, vehicles and supplies for second year of project.
-- Program long term training activities and sending off first year's trainees.

Second Year

-- Arrival of U.S. ART team members.
-- Make informal survey of existing farming system by the ART, with identification of key constraints on production, and specific innovations or changes which might improve the existing farming system.
-- Conduct brief, concise formal survey to confirm the findings and conclusions of the informal survey.
-- Analyze formal survey results.
-- Initiate field trials of promising innovations on experiment station within the context of annual research plans prepared by the Research Committee of the Ministry of Agriculture.
-- Prepare in-service training programs for extension agents.
-- Conduct in-service training programs at Murongwe.
-- Conduct brief in-house evaluation to monitor project implementation

X21

Third Year

-- Initiate on-farm experiments on 8-10 previously selected farms assuming station results warrant it.
-- Monitor on-station and on-farm experiments.
-- Initiate an informal survey of a farming system in the second commune.
-- Carry out formal confirmatory survey and analyze results.
-- Initiate field trials of promising technologies.
-- Evaluate results of on-farm experiments in first commune.
-- Continue modified field trials of promising innovations and initiation of a larger number of farm level trials.
-- Initiate demonstrations and field days explaining selected innovations to area farmers.
-- Evaluate the project by USAID and GRB, and tentative decisions regarding continuation, curtailment, or expansion.
-- (Possible) replacement of TA team personnel.

Fourth Year

-- Initiate seed production of improved varieties if warranted.
-- Continue all programs already begun.
-- Increase the complexity of innovations in farming systems including (if possible) livestock production.
-- Make some attempts at use of farming systems approach by ISABU at other centers.

Fifth Year

-- Continue research, extension and training.
-- Formulate follow-up project, including its size and scope, personnel, training, etc.

III. PROJECT ANALYSES

A. TECHNICAL ANALYSIS SUMMARY*

1. The Farming Systems Concept

A farming system consists of the full range of all crop, livestock and other production activities engaged in by farmers in a particular natural and social environment. The natural environment includes such factors as soil, rainfall, temperature, altitude, and topography. The social setting includes a number of factors affecting production such as traditional sex roles and division of labor in production tasks, and features of social organization governing access to economic resources. In areas where crop and livestock production is supplemented for many farmers by other important economic activities such as wage labor, migration, beer or charcoal production, these activ-

* For the complete Technical Analysis, see Annex E.

ities must be included in the farming system analysis. For many small farmers, non-crop production activities have a major effect on crop production goals and on family labor availability.

This project will focus specifically on a few crops within the existing farming system. However, successful innovation in a particular crop or crop practice requires an understanding of how that crop or practice is affected by and affects other components of the farming system. This is the purpose of an analytic approach stressing a systems perspective. For example, bean production cannot be dealt with in isolation. It must be considered in the context of prevalent intercropping practices and labor constraints associated with the production of other essential crops grown by the bean producer. The timing of labor requirements for land preparation, planting, weeding and harvesting of other widely grown crops such as sweet potatoes, bananas and cassava, must also be taken into account when attempting to introduce new crops, varieties or practices. Small subsistence farmers may be unlikely to adopt a new recommended practice if it conflicts with tasks required in the production of staple food crops. Recommendations for changes in small farmer production practices must be adjusted to take into account farmers' existing patterns of resource allocation.

2. Project Sites

The two project sites selected by the PP team from among three proposed by the GRB are Murongwe Research Center in Mutaho Commune of Gitega Province and Karuzi, capital of the newly created province of Karuzi and located in Bugenyezi commune. Both of these communes are in Burundi's densely populated central plateau region. This region lies between the Congo/Nile Crest on the west and lower altitude plains on the east. With altitudes averaging 1,500 - 2,000 meters, the central plateau represents about 30 percent of the country's total area and is where half of the population resides. Research results from the two project communes will therefore be applicable to areas containing half the country's population.

a. Murongwe Center

Murongwe is a relatively small agricultural research center in Mutaho Commune, an area of traditionally high population density (321 persons per square kilometer according to the 1979 census). Mutaho's population was 74,770, of which 47.2 percent is male and 52.3 percent female. With an altitude of 1,570 meters mean annual rainfall is approximately 1,200 - 1,300 mm and mean daily temperatures around 20°C. Like much of the central plateau, Mutaho is characterized by hills, narrow valleys and a fairly dense network of streams and rivers. Most families cultivate both hillsides and valley bottoms or marshes, with different cropping calendars for each type of environment.

Livestock production is far less important in Murongwe than it is in higher altitude areas such as Kisozi, due in part to scarcity of grazing land.

Coffee (first introduced 30-40 years ago) is the major crop in the region. It is grown in very small quantities by possibly 85 percent of the farmers. Coffee comprises a tiny fraction of total cultivated area (an estimated four percent in 1968). For most families, coffee production has second priority to food crops. In addition to coffee sales, making and selling beer and charcoal are also significant income sources for many households in the area.

Beans, maize, sweet potatoes, manioc and bananas are the principal food crops and occupy 75 percent of the area cultivated each year in Gitega Province. Beans alone occupy nearly a third of the cultivated area.

b. Karuzi

Bugenyuzi Commune, in which Karuzi is located, is less densely settled (153 persons per square kilometer) than Mutaho, but it receives increasing numbers of immigrants from densely populated neighboring areas. Bugenyuzi has a population of 60,160 of which 47.5 percent is male and 52.5 percent female. This area is somewhat flatter than Mutaho, and has a slightly lower rainfall.

The crop regime in Karuzi is similar to that of Mutaho, but some crops such as coffee may do less well here because of less rain. Soils retain moisture less well and dry seasons are somewhat longer. Livestock production is more important in Karuzi than in Mutaho. Small livestock such as sheep and goats are probably more numerous than cattle because residents are traditionally agriculturalists rather than pastoralists. There is still some uncultivated land in the Karuzi basin which may be suitable for settlement. A more detailed discussion of the Karuzi basin is in Annex E-3.

c. Rejected Alternative Sites

In addition to the two sites selected, the first PP team also considered and rejected as a site the Kisozi Research Station. Kisozi is located on the Congo/Nile Crest and is Burundi's major high altitude research station. Unlike Karuzi, however, it already receives a high degree of foreign donor assistance (particularly Belgian assistance) which was one reason for the PP team's rejection of it as a project site. Another reason was that high altitude regions over 1,800 meters represent a much smaller proportion of both total population and land area than does the Central Plateau region chosen for the project. It is, however, in the same ecological zone as the Basic Food Crops seed farm and the area where the seeds will be distributed along the Zaire/Nile Crest by the European Development Fund's extension component of the High Altitude Food Program. In the PP team's judgment, the first phase of the project should concentrate on the region most representative of Burundi agriculture, the Central Plateau. In addition, travel and logistics problems would make it difficult to cover both Murongwe and Kisozi. Karuzi and Murongwe, on the other hand, can both be easily covered by one team. If the project is extended for a second five-year phase, a high altitude region such as Kisozi might be an appropriate third project site.

3. Research

a. Mechanism for Research Collaboration

The major new initiative in this project is establishing a mechanism for close collaboration between the Ministry of Agriculture's extension and research branches. As discussed in the project description, this will be done by setting up adaptive research teams (ART's) within a new Department of Farming Systems Research and Extension at ISABU. It will be composed of members of both branches. The research agronomist, extension specialist and agricultural economist on the ART will work directly with farmers in order to focus technical research directly on small farmer production constraints. The agronomist will also work directly with ISABU research staff in planning and supervising on station research relevant to farming system needs.

The SFSR technical assistance team will work closely with ISABU researchers at Kisozi, Burundi's principal research station, as well as at ISABU's Murongwe centre and the new Karuzi station. The agronomist will be involved in planning and supervising research projects at ISABU stations that will lead to off-station tests. The project will use technology such as improved seed from ISABU research. At the same time the team will help identify and transmit to ISABU researchers production problems or constraints facing the farmer for which research solutions are needed.

b. Soil Fertility and Cropping Systems Research

A lack of adequate on farm soil fertility maintenance system is a major problem in the project area. This conclusion is based on observation of growing crops, interviews with farmers, the results of FAO fertilizer trials*, and the views of expatriate research agronomists working in various capacities for the Burundian Government. The general consensus is that low soil fertility is the number one constraint limiting crop production. Farmers often complain that they have few or no livestock for production of manure and that chemical fertilizers are unavailable. They recognize the value of organic compost and mulches and generally utilize available organic wastes for that purpose but the quantities of compostable organic materials are insufficient to generate the amount of compost needed. Many farmers in the Central Plateau have no livestock, others have only a few head of goats which produce little manure.

The soil fertility problem is frequently compounded by high soil acidity (low pH) and the presence of toxic quantities of aluminum and possibly other elements, coupled with a low level of available calcium. High acidity also reduces the solubility of soil phosphates, a critical plant nutrient especially for corn, beans and other leguminous crops. Lack of farm manure and the present unavailability of fertilizers results in continuing soil deterioration with respect to available nitrogen. This is especially true on farms that are producing crops with a high nitrogen requirement such as maize, bananas and grain sorghum.

---

* Rapport du Programme Engrais, République du Burundi, Département de l'Agronomie, FAO, 1978.

x25

During year two of the project the expatriate agronomist and ISABU staff will plan and begin to carry out applied and/or adaptive research on the important soil fertility and soil conservation problems of the project area. The research would be mainly on the Karuzi station, but on-farm verification tests and trials would be required. Following are some of the problem areas which we believe should be given priority although not necessarily in the order listed:

(1) Development of crop rotation systems, including grain legumes, which make the most effective use of available farm manure. One objective would be to determine the minimum amount of manure or compost needed to assure a response from chemical fertilizers. Numerous fertilizer trials in Burundi did not show a positive response to chemical fertilizers in the absence of manure or compost. On the other hand some of the FAO fertilizer demonstrations in 1977-1978 indicated that the kind of preceding crop (maize and beans interplanted) had a greater positive effect on yields than did manure applied to fallowed land.

(2) Determination of the number of heads of livestock needed to provide the minimum amount of manure required for the particular crop rotation under study.

(3) Adaptive trials to identify the fertilizer needs of the important crops grown in the project area. The FAO fertilizer studies referred to above show that nitrogen and phosphorus increased yields of wheat, corn, grain sorghum, beans and white potatoes.

(4) The soil acidity problem. A search should be made for any available liming materials such as limestone, marl or other calcareous deposits in the project area, which could be exploited.

(5) The possibility of increasing the amount of biologically fixed nitrogen in small farming system by innoculation of the bean, or other legume crop, Rhizobium which may be available at the International Research Centers or in the U.S.

(6) In addition the development of cropping systems which include perennial tropical legumes such as Pueraria, Stizolobium, Desmodium and other tropical legumes should not be overlooked. Such legumes could provide feed for livestock, increase the nitrogen and organic matter contents of soils and protect against soil erosion. These crops currently grow in Burundi and should be more widely tested.

c. Soil and Water Conservation

Soil erosion by excessive water runoff is rampant on much of Burundi's steep sloping land. The soils of the project area are no exception. The principal causes of soil and water losses in the project area are:

-- The cultivation of lands that are too steep, often in excess of 25 percent slope, which results in excessive water runoff during heavy rainfall;

-- The removal of forest cover from steep lands; and
-- Overgrazing and trampling of soils reducing water infiltration.

Since the Karuzi basin is in a region where loss of rainfall by runoff aggravates the problem of low soil moisture during the dry season, it is important to consider soil characteristics in choosing cropping systems for individual farms.

Crop cover during the rainy periods is the main practice to reduce water and soil losses. Present knowledge of soil and water conservation practices are believed adequate to provide guidance for selection of measures needed to control the heavy losses of water and soil on the sloping lands of the project area. The characteristics of the soil, kind of crops being grown or other vegetative cover and the amount and intensity of the rainfall determine most of the specific practices required.

As a basis for choosing the practices to be followed, the Soils Division of ISABU or the Contractor, using its own resources or by subcontract, will make soil survey and land use capability maps of suitable scale of the project area. (We understand that detailed soil surveys have been done and published for the Karuzi basin). These maps should be accompanied by an explanatory and interpretative text containing specific agronomic recommendations for each of the land use capability units appearing on the map. Such recommendations might include a listing of the crops suited for each of the different land use capability areas, recommended crop management practices, and special practices needed to control surface water runoff and soil erosion.

Land use capability maps will be especially useful for (a) guiding the settlement of presently uncropped land, (b) identifying land that should not be cropped but left in pasture and (c) designating those areas suited only for forestry.

4. Extension

The absence of close coordination between MOAL's research and extension institutions has in the past often meant extension field staff were not provided with the relevant technologies to transfer to small farmers. Many other technologies performed well on the experiment stations but did little better than local varieties under the low fertility conditions on farmers own fields for reasons discussed elsewhere. The extension staff has also been hindered by deficiencies in in-service training, transportation and logistical support, and demonstration supplies. In addition, supervision and control have been very weak and it is not clear that performance would have been much better if technologies were more adapted to farmer conditions and agents had more resources.

The Ministry of Agriculture recently modified the organization of the extension service so that extension workers are now assigned only to two administrative levels - province and commune. In addition, in 1980, it initiated a new type of extension program in which all farmers in a given

section of one commune are provided with a single new technological input such as improved seed. The Ministry believes such an approach has a greater chance of making a significant impact given existing social attitudes than does giving new inputs to a scattered handful of farmers. Extension workers assist these farmers during the planting and growing season and monitor the growing crop. They help set up small demonstration plots on farmers' fields according to a set of guidelines prescribed by the research institute. These concern such factors as seeding rate, row planting, and use of farm manure.

This type of program is still new and not very extensive in Burundi. The SFSR project will build on this program, encourage a food crop emphasis, and introduce the ART concept as a means of formalizing stronger links between research, extension and small farmers. This will help to bring recommended practices into closer conformity with what local farmers can actually do. It is of little use, for example, to recommend that farmers apply a quantity of farm manure which far exceeds that available to most of them on their own farms, or to recommend purchased inputs which most farmers cannot obtain. Research and extension activities must be conducted with a clear understanding of farmer circumstances. The SFSR project provides a model for doing this through the ART's.

The project will provide a U.S. extension specialist to assist the adaptive research team in its work at the commune level. The specific duties of the extension specialist are:

(1) Participate in the informal diagnostic survey and in monitoring and evaluating the data collected from the formal confirmatory survey.

(2) Accelerate the transfer of applicable technology from the research institute, through the extension service, to the farmer.

(3) Strengthen the extension feedback process to advise researchers on farmer production constraints.

(4) Upgrade research output through test trials and demonstrations in farmers' fields.

The extension specialist, in cooperation with local agricultural agents, will recruit farmers to test on their own fields the technologies/ varieties tried out on the research station. He will then help to transmit back to the research station information about the farmers' successes and further needs. The U.S. extension specialist will train local extension workers to help plan, implement, monitor and evaluate farm level field trials. Extension officers will also receive practical training at farm trial sites in the management and cultural practices required to grow cereal, grain legumes and tuber crops. Knoweldge gained at farm trial sites through associations of extension and research officers will be applied to encourage other small farmers to modify their present farming system.

For a further discussion on how the extension function will work in this project, see the Technical Analysis Annex.

5. Training

a. Long-Term Training

The GRB does not require university level students to follow any particular course of study although attempts are made providing guidance. Students pick their own majors in much the same was as American students. As a result, technical and science fields often lack sufficient candidates compared to national needs. The MOAL prefers to emphasize non-degree training for experienced staff in order to reduce outward mobility of the returning scientists, maximize the relevance of the training received and minimize the period of training. It also prefers that project training be done in Africa as much as possible.

The Small Farming Systems Project will train technicians at several different levels and from different backgrounds in order to better cope with the shortage of highly trained agricultural technicians in Burundi. Because of the low number of university entrants opting for an agricultural orientation, bachelor's degree level training in the U.S. would only reduce the pool of students available to the Faculty of Agronomy at the University of Burundi and the new Higher Technical Institute of Agriculture, a clear step backward. At the graduate level, the scarce supply of engineer level agricultural technicians prevents a major reliance on them for long-term graduate degree training. Given this situation and MOAL preferences, the project relies primarily on graduates of the Faculties of Science and Economics for graduate degree training and puts greater emphasis on medium-term, non-degree training for persons with previous agricultural training. The project budgets an extra six months of training for Science and Economics graduates pursuing graduate degrees in order to allow them to take additional courses in technical agriculture. The assignment of the students on their return to Burundi will then be done so as to pair technicians having a relatively weak background in technical agriculture with those who are stronger in this area. This approach enables the project to achieve its training and technical staffing objectives without unduly straining the available supply of higher level technical agriculture manpower in Burundi.

The scheduled training period includes four to six months of English training for both long-term and medium-term personnel. Because of Burundi's desire to strengthen its contacts with English speaking East Africa and because of the greater availability of research materials in English, allowing so much time for language training for a 12 month study assignment should not be considered excessive or wasteful.

The current GRB salary policy favors short-term training. Individuals away for training for less than 18 months still collect their local salary in addition to their subsistence allowance in the country of training. The project should be able to design training programs to end just under 18 months and, as a result, reduce the reluctance of higher level technicians to spend such a long time in training without getting a degree.

Both the length and location of training may be adjusted, from that indicated in Annex K-1, depending on program availabilities, the background of nominees accepted for training and counterpart availability.

Because of time and location uncertainties, all long-term trainees will spend a relatively brief period at selected international research centers on their way home in order to bring them abreast of research work currently underway relating to their area of specialization.

b. Short-Term Training

The project will provide short-term training of three to six months at various international research centers to approximately nine Ministry of Agriculture technicians. These courses would cover such subjects as farming systems research; cereals, grain legume and tuber crop protection; and research and extension administration. This component may also finance study tours in other African countries.

c. In-Service Training

The in-service training in Burundi will focus on upgrading the professional skills of research assistants, MOAL extension personnel and field extension officers of other institutions working in the project area. In addition, the project will offer one day training sessions in cultural practices and new crop varieties to nearby farmers. The agricultural economist will provide in-service training for field interviewers and data processors.

Training sessions for research extension personnel will range from one to five days in duration. These will emphasize specially designed agronomic workshops and field tours. The training sessions will be planned and conducted by the MOAL professional staff and the U.S. university contract team.

A short-term U.S. training consultant will be provided in the first year, and thereafter as needed, to work with the MOAL in compiling an in-service training plan to include scheduling, curriculum and methodology. Course materials will be refined and improved with experience. The final farmer training materials will be made available in a usable form to Foyers Socieux rural training centers and primary and secondary schools. This will significantly increase the number of project beneficiaries.

d. Information Services

The project will provide some funding for audio visual and duplicating equipment. This equipment will produce printed material of an educational nature for farmers, training centers, and extension officers. The printed material will be disseminated to farmers and extension officers at the training sessions. The first internal evaluation of the project will examine closely the project's training and information activities to determine if additional funding or consultant services are required to further strengthen them.

B. INSTITUTIONAL ANALYSIS

Since one of the key objectives of the SFSR project is the institutionalization of a process, for conducting research, AAO/Burundi and the GRB

have deliberately decided to use existing organizations, to upgrade them and improve institutional capacity to conduct applied agricultural research, while improving the linkages between the organizations.

This section presents a brief discussion/checklist of institutions and organizations, most of which are discussed elsewhere in the project paper.

1. Organizations Reporting to the Minister of Agriculture and Livestock

a. ISABU

The Institut des Sciences Agronomiques du Burundi (ISABU) s the GRB entity charged with agriculture research, in particular the develop- ent of new technologies in the form of improved varieties and agricultural ractices. It is a semi-autonomous institute under a Director General reporting o the Minister of Agriculture and Livestock, and therefore it has more flexi- ility in staff and budget than a "line" civil service department. It has bout 44 professional staff trained at Ingénieur Agronome/License level, slightly ore than half are expatriates. It currently has five principal stations out- ide Bujumbura and five smaller centers. Only one small center currently exists n the large and populous central plateau region, but the proposed Karuzi station, sing land (and some facilities) of a former royal farm will remedy the situation.

ISABU is organized into several divisions: Land Development includes Environment and Soils), Socio-Economics, Plant Protection, Animal roduction, Crop Production and Research (Food, Forestry and Industrial Crops), lus Administration. A plant breeder, for example, may be assigned to one tation and live there, but he will supervise countrywide trials in his speciality ithin the Food Crop Section of the Crop Production and Research Division.

As discussed in Section I-D, III-A and Annex E, ISABU's program has shifted its emphasis towards Food Crops in recent years. Staffing and organization (including an organigram) are provided in Annex F. The SFSR project will result in the creation of a Farming Systems Research and Extension (FSRE) Department at ISABU. Administratively, the project itself is attached to ISABU and the FSRE Department will be responsible for the works of the Adaptive Research Teams. Each ART will include extension specialists seconded from the Agronomy Department of the MOAL.

b. Department of Agronomy (or Crop Extension)

Transfer and application of technologies developed by agriculture research (including soil conservation) are the responsibility of the Department of Agronomy. The Department of Agronomy is a line civil service organization reporting to the Minister of Agriculture and Livestock, through the Director General of Agriculture. Agronomy staff at provincial, commune and local level play a major role in cash crop production, with increasing responsibility for food crop production, and gathering and collating agricul- ture production statistics. They play a major role in coffee production. They are not responsible for:

X31

-- Livestock - (A separate MOAL Directorate General reporting directly to the Ministry).
-- Water and Forests) Separate Departments within the Direc-
-- Fisheries) torate General of Agriculture.
-- Rural Development Corporations (Integrated Rural Development Projects, donor financed).
-- Other area specific/crop specific production projects.

Details are given in Section I-D, III-A and Annex E.

The local Department of Agronomy staff will be involved directly in the SFSR's farmer field testing program, under the guidance of ART and project staff. Agronomy personnel will receive considerable training, both on and off the job.

A key weakness in the past has been the lack of interaction between the research and the extension staff in solving the farmers problems. Building this linkage is one of the key objectives of this project, since it is the agronomy staff who have the direct working land contact with the farmer.

c. Sociétés Régionales de Développement (SRD)

The SFSR project, as it matures, will develop varieties and agricultural practices which can be extended through the extension staff of the integrated rural development programs run by the SRD's (Regional Development Corporations). Two are located within the central plateau ecological region: a well established one for Buyenzi in Ngozi Province and a new one for the Kirimiro (Citege area). Both are IDA-financed integrated rural development programs specializing in coffee and food production (See Section I-E). The Murongwe center is in the northern part of the Kirimiro project, just south of Buyenzi.

d. Other MOAL Departments and Directorates General

It is clear that the ART and project staff must work closely with technicians of other MOAL departments. Since maintenance of soil fertility is a major problem, and farmers recognize the value of organic composts and mulches, but realize that the amount they have available is insufficient, the SFSR project will need to work closely with livestock researchers and extension staff to conduct soil fertility research and execute on farm verification tests and trials. The forest and livestock staff should also investigate cropping of perennial tropical legumes for animal feed and soil conservation.

e. Educational Institutions Supervised by MOAL

The Institut Technique Agricole du Burundi (ITAB) trains students as agriculture technicians. The four-year post-secondary school program is being transferred to Karuzi. ITAB graduates between 40 and 60 agriculture technicians a year most of who work as commune level agricultural technicians and work as extension personnel on crop production, livestock and

and forestry programs. ITAB graduates will work in the SFSR project, five ART or ISABU members, following project financed training, and others on second ment. The relocation of ITAB at Karuzi, however, will facilitate exposure of post secondary students to techniques needed for applied agricultural research testing on stations and in farmers fields, elementary analysis of field trial data as well as inculcating a sense of the farm or rugo as a whole or unit. The students will also provide a pool of interviewers for project technicians to use for field surveys.

In addition, when the school is not in session, the Karuzi ITAB facilities will be used for in-service training programs under the project thus reducing project costs.

The new Higher Technical Institute of Agriculture will take over ITAB's Gitega facilities. This institute will train B.Sc. Agriculture level technicians. The role that this institution, its staff and students would play in the project would be similar to, but at a slightly more advanced level, than that of the relocated ITAB. The Gitega campus is located about 30 minutes, by good road, south of the Murongwe research center.

2. University of Burundi

The University of Burundi falls under the authority of the Ministry of National Education. Unlike its U.S. counterparts, the Faculty of Agronomy (which is very small and lacks facilities) has no responsibility for implementing agriculture research, but individual students must carry out a research project and prepare a mémoire before they graduate. In addition, it is probable that joint programs for M.Sc. level research may develop in collaboration with foreign universities. There already is considerable interest in conducting research on soils in Burundi (about which little is known), which could tie in with applied work done under SFSR.

The Faculty of Agronomy and the Department of Sociology will benefit from students receiving graduate level training in the U.S. as well as grants for special studies within Burundi. Local students will be very useful in helping to design socio-economic surveys, administering them, and assisting in interpretation.

3. Local Government

The cooperation of local government officials is crucial for the sucess of the field surveys and farmer trials, in providing everything from information on population distribution to enlisting good will. They can promote the diffusion of results and encourage participation. Local government is already involved in agriculture input distribution for cash crops.

4. Foyers Sociaux

The Ministry of Social Affairs runs the Foyers Sociaux which are rural training centers, mostly for women. They have their own staff (predominantly female) and are involved in basic health, nutrition, child care and to some extent, agriculture training activities. Since women are the

X33

producers of foodcrops, reaching the women with new agriculture techniques is one of the most important areas of the project. This cannot easily be done through the Department of Agronomy as it is now constituted without involving an institution such as the Foyers. A Foyer Social already exists at Karuzi.

C. ECONOMIC ANALYSIS SUMMARY

1. Economic Impact

In the long run the SFSR project will change the way in which agricultural research priorities are defined in all research stations in Burundi. The change in approach -- toward defining research priorities with the active participation of farmers and carrying out research under actual farm level conditions -- should greatly increase the efficiency of all expenditures on research and generate more rapid increases in agricultural production than would occur without the project. Though it is only conjecture, the second PP design team estimates that this project will speed up the adoption of a farming systems approach by six to eight years over what would occur without the project. With the rapid spread of the concept elsewhere in the East Africa region it is only a matter of time before researchers begin experimenting on their own with the farming systems approach.

In addition to the approach to research which the project will interject into Burundi research programs the amount of resources going to agricultural research will also increase. The project provides twelve person years of research technical assistance and trains eleven Burundians to take up positions in the country's research organizations. Though part of this increase will probably be offset by gradual declines in expatriate technical assistance elsewhere it nonetheless represents a net increase over the level that would prevail without the project. With farming systems training, these researchers should also be more effective. Moreover, these resources will address agricultural production problems in the country's large central plateau area which, as yet, does not have a major research station. The net result should be more rapid diffusion of acceptable output increasing technologies across wider production base.

The favorable impact on production arising from reorienting research and increasing the resources going into this highly productive area of research will increase cash incomes and supplies of domestically produced foodstuffs for urban consumers. With appropriate supportive government policies this should lead to a decline in food imports and a stronger foreign exchange position for the country. This in turn, can permit greater importation of investment goods which, if appropriately invested and managed, can increase the country's wealth still more.

Changes in the farming systems brought about by the project should also help reduce risk and improve nutrition of rural families, especially as work on the integration of crop and livestock production aimed at improving soil fertility gets underway in the latter part of the project's first phase.

In terms of the more immediate benefits, several hundred farmers and extension agents will benefit from training provided by the project.

Farmers will benefit from availability of improved seeds, though this benefit has already been included in the form of increased production from the project.

One of the most important short term benefits will be the identification of extension management systems which can substantially improve the effectiveness of existing extension agents without substantial increases in material resources. Such an approach would have nationwide implications if replicable. Putting a quantitative estimate on this mix of benefits would be foolhardy. Different area and yield figures for the same provinces vary by over 200 percent. There is also no clear limit on the geographical area which will benefit from the spread effects of the project as research becomes more orientated toward farmer problems throughout Burundi. These long-term spread effects will, hopefully, completely swamp the localized benefits to the 200 or so farmers and the collines in which they are located.

This project is not without its risks. The farming systems approach is still essentially untested in Africa, at least through to the innovation diffusion stage. In addition, high internal rates of return to agricultural research in general that have been found for the U.S., Mexico, India and elsewhere would almost certainly not apply to Burundi where the small size of the country and its varied micro-climates greatly reduce the area of production over which a given research expenditure can be amortized. However, much of this research will be done whether or not this project proceeds. The major benefits of this project is in increasing the effectiveness of those other expenditures, whatever they may be. It therefore should have a higher rate of return than most research expenditures in Burundi.

With these qualifications, the PP team believes that the anticipated benefits of the project can be achieved if the conditions that are outside the control of the project are fulfilled. These include the GOB providing counterpart staff and qualified trainees, availability of inputs such as seed, and favorable producer prices. These and other factors will influence the magnitude of the project's overall impact.

The difficulty in estimating the project's benefits, of course, does not make them any less real. It does, however, prevent the use of rigorous cost-benefit analysis. For this reason a cost effectiveness approach has been utilized to evaluate this project.

2. Cost Effectiveness

The SFSR project has been designed to achieve its stated objectives in a cost effective and efficient manner. Other possible project designs were evaluated to be less effective and more costly than the chosen project design. One alternative examined was to under the the research and extension required in Burundi by expatriate technicians on assignment to the GOB. The cost of providing such technicians in Burundi is over $130,000 per year. At the end of the project this recurrent cost burden would either shift to the GOB or research activities begun by the project would cease.

The recurrent cost burden would be substantially less (no more than US$10,000 per technician per year, including all benefits) if Burundi were trained to replace expatriate assistance by the end of the project. In

X35

addition, the project trained Barundi would have the advantage of bringing a lifetime of knowledge about Burundi agriculture to bear upon the country's farming systems problems. In the long term, they could be more effective than expatriates because of their experience in Burundi, their ability to communicate with farmers, and continuity in research and extension programs. For these reasons using expatriate technicians for implementing the project over the long term is not a viable option. They can, however, be useful in implementing a new concept and training Barundi in its use.

The PP team also considered expanding the Faculty of Agriculture at the University of Bujumbura to train graduate level researchers and extension officials. Eventually this will be done. However, the magnitude of the problems preventing the development of the University to assume this responsibility are great. The Agricultural Department averages less than twelve graduates per year. It has no permanent facilities or research grounds and its budget is very limited. Furthermore, there are few trained Barundi to staff the Department; expatriates presently fill most of the positions. Finally, using the University of Burundi would entail a major policy switch regarding the institutions delegated as having primary responsibility for agriculture. The responsibility and administration of agricultural research is in the Ministry of Agriculture and Livestock and presently has little to do with the University. Attempting to build up the Department would make the project significantly more costly, larger and longer in duration. While such a proposal may be justifiable in the future, for the present, a small project of less wide ranging scope can get the GRB started in the direction of applied agricultural research aimed at small farms, at a cost the GRB can afford.

The final alternative examined was to determine if the present research and extension orientation would result in the needed improvements in agricultural productivity in the same length of time. The PP team concluded that Burundi's current research programs are not oriented directly to the needs of small farmers, and thus cannot solve their problems now or in the future. At present, research is not being effectively tested and modified to conditions on Burundi's small farms. As a result the extension system has little useful research to draw upon for the content of its programs. Also, their role in guiding research programs has been insignificant. Since the present is ineffective, a change to the system that has worked well elsewhere seems to be in order, both in technical and cost effectiveness terms. As a result of these analyses of possible alternatives and other research by the PP team, this project design was developed.

D. BENEFICIARIES AND SOCIAL SOUNDNESS*

1. Benefits, Burdens and Spread Effects

The major beneficiaries from the SFSR are those farmers who eventually use the innovations developed by the project. This happens in the medium to long term future, and is much more apparent five years after the end of the project, than at completion. We also anticipate that the agricultural

* See Social Soundness Annex for additional information.

research system as a whole will pick up the methodology developed in this project and apply it to other ecological zones.

ISABU and the MOAL extension service will be the primary short term institutional beneficiaries. Others are ITAB (post secondary agriculture technical school) and the Foyers Sociaux. Individual farmers who participate in the tests and training sessions will also benefit.

The success of the project depends heavily on the ability of the project team and associated GRB staff to observe and work with farmers. This interaction is intensely personal and requires, in some cases, a changed approach to what the farmer is doing, since farmers usually have an underlying reason (cost, labor, chemical, biological) which may not be articulated clearly. Therefore, the project staff will have to help and GRB personnel working with them both in terms of methodology and approach to obtain maximum results from the micro-level farming approach. Some training, but more importantly, on-the-job guidance, will be provided by the SFSR project.

It is very important therefore that project staff have fluent French. While senior GRB scientific and technical staff may have serviceable English, the lower level agriculture assistants and moniteurs will often have only a modest level of French. Very few farm family members will have any French at all and most will not speak Swahili. If a member of the contract team has fluent French and is willing to learn a "hard" language, we will encourage him/her to do so, because we believe the project will benefit immeasurably.

Since women are the major producers of food crops, the project must work directly with them. Given the reluctance of women to talk with "strange men", it is important to have a number of women involved as interviewers and extension workers in the pilot areas (see below).

2. Long Term Benefits, Burdens and Spread Effects

As is the case in most adaptive research projects, the major beneficiaries of the project gain from investment in the project over the medium to long term. In this case, the major beneficiaries from SFSR will be the farmers who eventually use the varieties or cultivation techniques tested under the project. Project innovations will not be released for general extension use before year four of the project and the full spread effect may not occur for eight to ten years after project authorization.

Acceptance of a specific innovation will make it possible for a family to increase the yield of a subsistence crop and meet the quantity need for that crop on a smaller area. This would, in turn, produce benefits such as the following:

-- Make available additional land for a non-food cash crop such as coffee (thus increasing income);

-- Free a portion of the holding for other food crops (thus increasing variety in the diet and improving nutrition);

-- Enable the family to sell a food crop surplus (thus increasing income) and/or

-- Produce enough of the food crop to meet both consumption needs of the current season and seed needs for the next.

The constraints faced by farmers in the two pilot communes are similar to those found throughout most of the Central Plateau. The Plateau covers slightly more than 30 percent of the country's area and possesses about half the population (or slightly more than two million people). Both the extension staffs and farmers facilitate the spread of innovation, making predictions difficult. In addition, not every farmer will have farm conditions permitting use of the innovation. While it is improbable that every farm household will end up using a project-developed innovation, a fairly large number of people should pick up one or more, if both formal and informal extension systems are reasonably efficient.

The cost of spreading the innovations will be reduced somewhat by turning them into written and audio-visual form for use by the Ministry of Agriculture extension service and integrated rural development program (Kirimiro, Ngozi III, etc.). The rapidity of such spread effects depends partially upon the willingness of the GRB (and donors) to commit resources to diffusing agricultural improvements developed in the SFSR project. It will also depend upon reducing the weaknesses in the extension service(s) such as lack of adequate supervision, low morale, lack of transport and shortage of operating funds.

Another important spread effect is partially institutional. It depends upon the agricultural research system as a whole picking up the methodology of applied agricultural research on farming systems and applying it in research carried out in other ecological regions in Burundi.

3. Beneficiaries in the Short Term

a. Institutional

There will be two major institutional beneficiaries: ISABU and the Ministry of Agriculture's extension service. Both will receive benefits in the form of training at several levels, as discussed in Sections I and II. Project financed training will improve the quality and direct applicability of agricultural research, as well as improving the quality of the extension service and widening its impact on local farmers. The project will upgrade the extension services by improving transportation available to extension agents in the two pilot communes by providing bicycles and motorbikes. As a result, services available to farmers should improve as the extension workers reach more people with relevant information.

Another beneficiary will be the post secondary level agricultural training institute - ITAB - currently being transferred to Karuzi. Students and teachers will become acquainted with the methodology and work with the on-farm testing program. They will gain knowledge of how to introduce relevant innovations, as well as help team members from time to time with their surveys and on-farm surveys and enquiries.

A minor institutional beneficiary will be the staff of the Foyers Sociaux or community development centers which have traditionally been involved in the extension of women's programs but have not done much work on crop extension. One already exists at Karuzi.

b. Individual

Individual beneficiaries during the life of the project will include those people who participate in the on-farm testing programs in Mutaho commune in Gitega Province and Buyenzi commune in Karuzi Province. A total of about 140 to 200 farm families will receive improved agricultural technologies for testing under the project. About 600 to 800 farmers will participate in training sessions and field days sponsored under the project.

Benefits to families living in the two pilot communes will include acquisition of new knowledge about means of increasing food crop productivity in particular and total productivity of the farmstead. Since the project concentrates specifically on increasing food crop productivity in its early stages, families will also benefit from the increased food intake and improved nutrition. They may also have increased income as a result of selling food surpluses.

4. Benefits Accruing to Women

Women in particular will benefit from the project's activities. It is women who traditionally exercise control over much of the disposition of food crops and who are largely responsible for cultivating them. Any saleable surplus in food crop production is likely to benefit women since it is they who sell small amounts of such crops as beans, maize, bananas, etc. in local markets in order to acquire cash to meet other basic household needs.

Women generally control the disposition of income from sales of small quantities of food crops until they reach home, where the money falls under male control and is less likely to be spent on household necessities. Women can generally assume control of such income only by spending it before reaching home. This is culturally acceptable if they spend the money on necessities such as salt, cooking oil or small quantities of kerosene for lamps.

In short, increased food crop productivity will benefit women and children by improving family food supply and nutrition (through increasing consumption of self-produced food and/or increasing ability to purchase foods not produced on the farm). These benefits should outweigh possible burdens such as increased work for women resulting from higher yields. The project will stress training women for reasons stated in 7 below.

5. Economic Status of Participating Farmers

We consider that the technology introduced in this project will be neutral, i.e. that it will not, of itself, increase the gap between the relatively rich and the mass of rural poor. The poorest farm families, however, do not have a sufficient "cushion" to be the first experimenters with a technological innovation which might reduce their subsistence food production.

The first innovators will probably be middle ranking farmers hungry to increase their production, while the richest will probably be more interested in off-farm investments at first. We anticipate, however, that with the guarantee fund against losses, that many farmers among the rural poor will be willing to experiment with the new innovations to a certain extent, and once the technology is proven to their satisfaction will move in rapidly.

Both the Karuzi and Murongwe areas are average in terms of income. Farmers grow coffee, but not nearly as extensively as in Ngozi and Kayanza provinces to the North and Northwest. Average annual cash income per family is probably between $56 and $110. There are very few cattle in the Murongwe area, but more are seen in Karuzi. Outside of salaried officials, almost all the population falls into the IBRD definition of rural poor for Burundi.

6. Sociocultural Feasibility and Farmer Motivation

Successful introduction of agricultural improvements to reach the beneficiaries will require (1) selecting agricultural innovations which are economically and socially compatible with the existing farming system; and (2) disseminating information concerning these innovations in a manner which both makes them credible in the eyes of local farmers and which succeeds in reaching a large number of farmers. In order to acquire an accurate understanding of existing farming systems, their socioeconomic context, and the suitability of specific proposed innovations, the project team and its local counterparts will have to work very closely with small farmers. In many respects the success of the project will depend upon the degree to which project personnel can break through the barriers of farmers' natural suspicion and mistrust of outsiders. This will be essential both in order to acquire accurate information from farmers and to disseminate new information concerning agricultural innovations to farmers.

Once farmers' trust has been acquired, some can be motivated to risk participation in the project's farm level field trials. Because most small farmers in Burundi have very limited land, labor and capital resources and operate very close to bare subsistence levels, these trials must make minimal demands on farmers' resources if they are to be successful. Innovations will be particularly attractive to small farmers if they increase output without significantly increasing labor, since most Burundi farmers depend at present almost entirely on family rather than hired labor supply. This may change as cash incomes increase (we have observed some evidence of this in the evaluation of the first rural road project). A successful agricultural innovation must in addition require relatively little cash outlay and some provision must be made to guarantee that pilot farmers do not lose out due to crop failure. The very low incomes of rural families tend to be spent on a narrow range of essential commodities such as soap, salt, palm oil for cooking, kerosene, cloth and occasional foods not grown or not available in the region. The small annual cash income must be spent on the items mentioned above. Since farmers in the project area at present produce little or no food surplus, improved food crop yields resulting from this project should not produce negative consequences such as declining income and declining food crop prices. Citega Province, like much of Burundi, is characterized by high

population density, land scarcity, and insufficient traditional food production systems. Any food surplus produced should be locally saleable and consumable.

7. Institutions and Individual Participation

As mentioned throughout this project, the success of Small Farming Systems Research depends upon the individual farmer and family members in the experimentation. The farmers' problems and solutions must be incorporated into the applied research on the farm as a socio-economic and production unit.

The project will be administered primarily through ISABU and through the MOAL extension service in the Department of Agronomy. A number of non-MOAL institutions will be involved in increasing participation of the community in one way or another (See Institutional Analysis).

In addition, the support of local representatives of the central government should be sought, as they can promote spread effects, assist in explaining the project's goals to local farmers, and encourage their participation in the project.

Since women have so much responsibility for food production, it is necessary that the project have access to women. Since women would often be more effective than male extension agents in reaching female food producers, the SFSR project must locate women for training and for filling key positions.

In order to obtain valid results from surveys and questionnaires, experience from other projects indicates that it is extremely important to have one member of each interviewing team be a woman, in order to obtain accurate and detailed responses on rural household's expenditures, production and income. The SFSR project team must therefore recruit and train women as interviewers and surveyors.

At present, MOAL has relatively few women professionals. We know of at least one B.Sc. level degree holder in agriculture planning and project evaluation, and there is at least one female technician (ITAB graduate) in the Department of Agronomy. There are female statisticians. We do not know of any women who serve as commune level technicians or as moniteurs at the colline level.

The Ministry is deliberately trying to recruit female professional and extension staff. Before the change in policy emphasis towards food crops, having men only as extension staff did not present as much of a problem in reaching the (cash crop) farmer. In addition, until recently very few women completed secondary school (only three percent of all boys and girls of secondary school attend it now). Since Burundi society has no cultural bias against women engaging in mathematics, sciences and economics, the enrollment of female students in ITAB, and the Faculties of Science, Agriculture and Economics has gone up sharply as more girls complete secondary school. Between ten and 15 percent of each class of future technicians at ITAB are women, and about 20 percent of the students enrolled in the Faculty of Science are women. Despite marriage and children, the dropout rate appears to be

somewhat lower than that of male university students. It should be noted that two out of three AFGRAD fellowship winners to date in the sciences are women botanists. Given these factors, we believe that qualified women participants can be located for training and filling key positions as researchers and ART staff members.

Since Karuzi has been designated a provincial capital and will experience an inflow of families of administrators, as well as scientists, technicians and teachers connected with the research station and school, it should be possible to locate wives with at least some secondary school education who would be willing to be trained and work as interviewers, data collaters and even as extension assistants. (We have encountered sufficient comments from educated Barundi women that they cannot find suitable work upcountry, to make us think that we will be able to locate some GRB staff from this category).

The Foyers Sociaux, a division of the Ministry of Social Affairs consists of largely rural training centers (predominantly for women). A center exists at Karuzi. Educational material developed in this project will be made available to Foyers Sociaux rural training centers to augment their curriculum. Most Foyers Sociaux graduates are expected to remain in and help develop their rural settings. Some Foyers Sociaux extension agents could usefully be incorporated into the project, as they are based in their home areas and are familiar to local residents as well.

The Murongwe center does not have quite as many local resources to draw on for finding local staff. As GRB offices are transferred to Gitega (the country's second largest city is less than an hour from Murongwe on a good road) it may prove possible to recruit among the educated housewives for technical/professional positions.

The GRB and the SFSR staff must plan both the work and the organization of the ART and project very carefully to permit maximum participation of local residents as assistants, enumerators, etc. Interviewing teams should contain men and women. Supervisory arrangements must take into consideration the social framework, incorporate a program for on the job and short term training, and avoid structuring dead end jobs with no promotion possibilities (particularly among locally hired women).

E. ENVIRONMENTAL CONCERNS

An Initial Environmental Examination recommending a negative determination was submitted with the PID in May 1980 and approved in Washington as part of the PID review process. Since this Project Paper proposes no significant design changes from the PID, no further environmental analysis is considered necessary.

However, since the project's principal implementing agent will be the GRB's agricultural research organization (ISABU), a Condition Precedent to disbursement for construction of project site facilities has been introduced requiring ISABU and AID to develop and jointly agree on a list of pesticides and herbicides used in connection with applied agricultural research activities for SFSR, both on experimental plots and on farmers' fields. Information to be provided will include generic names, manufacturers' environmental data, recommended tolerances and rate of frequency of application, safety measures and training programs for ISABU and extension staff as well as farmers. This list will be in accordance with Regulation 16.

IV. FINANCIAL PLAN

A. AID PROJECT BUDGET SUMMARY

AID life of project contributions total $7.79 million including a ten percent contingency factor of $566,000 and a 12 percent inflation factor, compounded annually, amounting to $1,568,000. The FY 1982-83 base price of the U.S. contribution amounts to $5,656,000. Table IV-I on the next page lists the major components. Annex F contains the detailed budgets for the non-construction components. Annex K details construction costs.

This budget presents a 60 percent increase over the PID estimate of $4,822,000 for AID's life of project contribution. This increase does not reflect any change in the basic concept of the project but results from refinements in implementation and more detailed and accurate budgeting of inputs.

The principal additions are in the Technical Assistance budget, which has doubled to reflect a doubling of U.S. staff from two to four, and in construction costs, which have increased to about $800,000. The increase in the number of technical assistants was considered necessary to accomplish the project objectives and is explained in Section A of the Implementation Plan.

The increase in construction costs results almost entirely from the decision to locate the team at Karuzi and the very high costs of construction up-country. Construction costs are based on expenses at Kajondi. Using a more experienced contractor would reduce interim house rental costs since the construction period would be at least six months shorter. However, given previous USAID policy regarding the use of local contractors whenever possible, the team did not feel it would be wise to budget for the cheaper non-local alternative.

See Table IV-I on next page

TABLE IV-I: SMALL FARMING SYSTEMS RESEARCH PROJECT

AID BUDGET SUMMARY
($000)

Budget Item	Total P/M	Project Year 1	2	3	4	5	Total
Technical Assistance							
Long-term	(204)	110	500	500	500	500	2110
Short-term	(44)	15	149	163	134	192	653
On-campus support	(105)	55	55	55	55	55	275
Sub-total	(353)	180	704	718	689	747	3038
Training							
Long-term							
M.Sc.	(204)	60	120	100	50	10	340
Non-degree	(168)	60	60	50	70	40	280
Short-term	(205)	12	32	37	37	37	155
Research Grants	-	-	40	40	40	40	160
Sub-total	577	132	252	227	197	127	935
Commodities							
Vehicles		39	29	29	-	13	110
ART Field Equipment		12	12	6	-	-	30
Seed Equipment		-	41	-	-	-	41
Office Equipment		14	20	11	1	1	47
Household Furnishings		60	10	-	-	-	70
Sub-total		125	112	46	1	14	298
Construction							
Guest Houses		112	91				203
Technicians Houses		305					305
Training Centers		229					229
Engineering (5 percent)		32	5				37
Sub-total		678	96				774
Operating Costs							
Project Administration		34	34	34	34	34	170
House Rental		12	42	12	12	12	90
Vehicle Maintenance and Fuel		7	31	41	41	41	161
Expendable Supplies		3	25	5	23	5	64
Field Survey Team		-	18	17	17	17	69
Crop Insurance Fund		-	10	10	10	10	40
Misc. Research Expenses		-	5	5	5	5	20
Sub-total		56	165	124	142	124	611
Total Base Costs		1171	1329	1115	1029	1012	5656
Contingencies (10 percent)		117	133	112	103	101	566
Inflation (12 percent compounded)		-	175	307	452	634	1568
TOTAL AID CONTRIBUTION		1288	1637	1534	1584	1747	7790

AA

The training budget has not changed materially in spite of ten percent higher training costs and more realistic training periods. The number of persons going for long-term training has been reduced from 22 to 16 and more emphasis placed on non-degree training. These changes are in line with GRB policy and relfect more realistic demands on available manpower. Commodities costs have increased by 75 percent to take account of realistic project requirements.

A liberal contingency of ten percent has been retained but the inflation rate was reduced to 12 percent in line with recent worldwide slackir in inflation rates.

B. GRB CONTRIBUTION

The GRB life of project contribitions totals US$1,546,000 including contingencies and inflation. This amounts to about 17 percent of the total project cost and is not materially different from the PID in spite of substantial increases in the GRB construction cost component. Therefore the project will require a waiver of the requirement of Section 110 (a) of the FAA Act, that the Cooperating Country provide at least twenty five percent of the project costs with respect to the assistance being furnished. Burundi qualifies for the waiver in accordance with Section 124 (d) of the Act. (See Annex J for the Action Memorandum for the Assistant Administrator for Africa).

C. GRB RECURRENT COST IMPLICATIONS

Table IV-2 summarizes GRB contributions to the project over the first five years, as well as during the immediate post project period. There is a substantial increase in GRB support in the year immediately following the end of the project, largely arising from the need to replace equipment and vehicles purchased under the USAID component. These represent investments for maintaining the project as designed by USAID. If the project is successfu in identifying approaches to extension that do not require vehicle support, as it should, at least half of this increase can be avoided.

See Table IV-2 on next page

TABLE IV-2: SMALL FARMING SYSTEMS RESEARCH

GRB CONTRIBUTION AND RECURRENT COST SUMMARY: YEARS 1-10
($000)

Expenditure	Project Year					Life of Project Total	6	7-10
	1	2	3	4	5			
Personnel	24	73	156	195	220	668	215	215
Construction/Reconstruction	345	-	-	-	-	345	-	-
Land	122	-	-	-	-	122	-	-
Vehicles	-	-	-	-	-	-	53	21
Equipment Replacement	-	-	-	-	-	-	30	30
Expendable Supplies/ Commodities	-	-	-	-	-	-	5	5
Utilities	3	3	3	3	3	15	6	6
Total Base Costs	494	76	159	198	223	1150	309	277
Contingencies (10 percent)	49	8	16	20	22	115	31	28
Inflation (12 percent compounded)	-	10	44	87	140	281	258	296
TOTAL GRB CONTRIBUTION	543	94	219	305	385	1546	598	601*

* Includes inflation for year seven only.

A6

Moreover, the salaries of project trainees from ITAB who are assigned to the MOAL represent costs that would have to be borne anyway. Costs for the economics and science graduates assigned to the MOAL could be offset by recruiting fewer new graduates if the MOAL felt this were desirable. Finally, the high level of recurrent costs following project completion, even assuming all investments are maintained at their end of project levels, represents immediate post project growth rate in recurrent costs that is considerably lower than the rate prevailing during the last three years of the project itself.

Following the project, ISABU ART teams at Karuzi and Murongwe could easily be broken up and distributed to other ISABU research stations as a means of diffusing the approach of the ART. The concepts of farming systems research are not that difficult to learn nor that expensive to implement. Researchers at CIMMYT, Mexico, even question the usefulness of the confirmatory formal survey once farming systems research teams gain experience in diagnosing on-farm production problems and guiding research to solve them. Even if vehicles no longer operate and facilities run down, researchers can still work closely with farmers by using the ART approach on their own. This is the real advantage of trying to institutionalize an idea or an approach as opposed to a service or a facility.

V. IMPLEMENTATION PLAN

A. PROJECT COORDINATION (See Annex K and Annex F for Additional Information)

1. The GRB

a. Ministry of Agriculture and Livestock, ISABU and the Department of Agronomy.

Project implementation will require close coordination between two departments within the Ministry of Agriculture and Livestock -- the Department of Agronomy and Burundi's agricultural research institute, ISABU. Both of these departments, as well as higher levels in the Ministry of Agriculture and Livestock, have agreed that ISABU is best suited to be the project's main implementing agent. The adaptive research teams (ARTs) set up by the project will formalize ties between research and extension, as each ART will include members of both departments. The ART will report to the Director of the proposed Division of Farming Systems Research and Extension. The extension specialist on the adaptive research team will be an employee of the Department of Agronomy on secondment.

The U.S. project team leader will help coordinate the activities of the research and extension sections of the Ministry. The Agriculture Research Committee (with representatives from ISABU, extension and other appropriate agencies) will give its concurrence to the broad general plans and lines of research, although ISABU and the project will be allowed considerable flexibility in detailed plans and implementation methods. The

XAT

Minister of Agriculture and Livestock, as the superior of the heads of the research and extension organizations will resolve outstanding issues that cannot be solved otherwise.

Within the Department of Agronomy, the project will work with both the seed multiplication and extension division. Within ISABU, the project will work with the proposed farming systems research and extension division, as well as the socio-economics and plant production departments, and with the main Kisozi research station, the Murongwe research center and the new Karuzi station.

The province level agricultural officer will help to organize commune level farmer training and extension training. A short-term consultant specializing in agricultural training will develop a training program in conjunction with the MOAL.

Training institutions under the MOAL include the new Higher Technical Institute of Agriculture (which will be located at Gitega and train B.Sc. level technicians), the Agricultural Technical Institute or ITAB (which is being relocated at Karuzi) and the other lower level schools at Gihanga and elsewhere. ITAB and the Higher Technical Institute will play important roles as providers of interviewers and student assistants working on their independent work projects. Training facilities of these institutions can be used during vacations. The SFSR project, because of its location, will also provide the schools, students and teachers with access to applied agriculture research, and farmer field testing of innovations, thus helping to instill an idea of cross fertilization and linkage between research extension and the farmer.

b. University of Burundi.

The Faculty of Agronomy and Faculty of Economics will receive some assistance in the form of short special studies grants and sponsorship of students for American advanced degrees. Arrangements will be made with the University of Burundi administration and relevant department heads by the U.S. project administrator and senior team leader.

c. The Foyers Sociaux.

Inclusion of the "Social Centers", a division of the Ministry of Social Affairs, is aimed at involving women directly in the project's training and extension activities. Educational materials developed in the project will be distributed to some Foyers Sociaux rural training centers for incorporation into their curricula. In addition, some female Foyers Sociaux extension agents and/or graduates will be recruited to participate in the project's extension activities.

d. Local Government.

Finally, various levels of the government's central administration will play a role in publicizing project activities to local residents and enlisting their support. Particularly important in this regard will be colline representatives, who are long-term residents of the areas in

A8

which they serve. Those above them in the administrative hierarchy (zone chiefs, commune administrators, district commissioners, and province governors) will also be involved to varying degrees, Both project sites are within an hour and fifteen minutes drive (or less) of Gitega on main roads, thus allowing the U.S. team to work with both, and facilitating GRB coordination. The MOAL is among the Ministries eventually slated for transfer to Gitega, which will facilitate project administration.

2. U.S. Project Support

a. The U.S. University Contract Team

U.S. financed technical assistance will be provided through an AID Title XII contract with a U.S. land-grant university. A short list of appropriate universities will be drawn up by the AID Project Committee based in part on recommendations from the GRB, AAO/Burundi and REDSO/ESA. Request for proposals will be prepared and issued by the AID/W contract office, based on the requirements set forth in this project paper, as soon as possible after the execution of the Project Agreement and a PIO/T between AID and the GRB. Interested universities will submit proposals which will be judged by a selection committee comprising GRB representatives, AAO/Burundi, REDSO/ESA and AID/W. It is planned that the committee will visit the campuses of the two or three universities who are finalists.

The contract team will consist of a research agronomist, an agricultural economist and an extension specialist. A fourth team member will be an administrative/logistics specialist. Based on its recent experience in the start-up of projects in Burundi, the AAO believes the operations/logistics specialist should be brought in soon as possible after signing the contract (about eight months after project authorization). The first duty of this officer, who will be aided by a locally hired Barundi assistant, will be to coordinate and monitor construction arrangements with the GRB for the housing and training center at Murongwe and Karuzi as well as organize temporary housing in Gitega. The administrative specialist will live in Bujumbura. The university would also appoint a campus coordinator who would handle such matters as planning of participant training and short-term consultants' visits from the university campus in the U.S. This person would be the focal point of contact between the university and the field team, as well as with AID/Washington and the GRB.

The function of the operations/logistics specialist would be to relieve the technical staff of the many time-consuming administrative burdens inherent in project management. This person would not, however, be the team leader and would not be responsible for dealing at the policy level. The senior member of the team, to be designated by the university after all staff members are recruited, will bear the title of Team Leader and will be the team's official spokesman with the GRB and the AAO. The Team Leader would arrive at month 12 and the two other technical staff at month 16.

XAPI

b. Role of AAO/Burundi

The AID Affairs Office will maintain an active, though limited monitoring role in project implementation. First, the project team leader will keep the AAO informed of activities and problems on a regular basis both verbally, in the process of the quarterly implementation meetings, and in the semi-annual report and work plan.

The mission and agricultural officer will maintain frequent contact with the technical members of the team and will visit the project sites periodically. The time which the mission agricultural officer can devote will be limited by the fact that he will be monitoring two other ongoing projects as well as working on design of any future agriculture sector projects.

Since AAO/Burundi has only seven U.S. professional staff, it is precluded from any logistic management support of the project. The project, must be administratively self-contained, the full-time administrative specialist and a local-hire assistant have been included on the project staff. The Contractor will do almost all project procurement for commodities. The construction procurement will be done by the host country with AID approval according to regulations in HB 11.

c. REDSO/ESA

REDSO Regional Agricultural officers will make periodic visits to Burundi to monitor project process. A REDSO engineer will be called upon as needed during the construction stage and to inspect the completed buildings. In addition it is likely that REDSO staff will participate in project evaluations.

Please read Annex K-3 pp. 1-4 on construction procurement and pp. 4-5 on commodity procurement. Annex K-4, table 5, lists all commodities and timing of procurement.

B. IMPLEMENTATION SCHEDULE

Annex K-5 contains a calendar of events. Project implementation has two phases, one is preparatory (contracts, beginning construction, ordering of furniture) and the other, beginning in the second year, is implementational.

C. PROJECT MONITORING AND EVALUATION PLAN

1. Monitoring

Monitoring of project progress will be done through the quarterly implementation review meetings of AAO, GRB and Contract Team meetings, as well as the contractors semi-annual report and work plan.

2. Annual Project Monitoring and Evaluation

Internal AID monitoring and evaluation analyses are planned at the end of years two and four. The AAO/Burundi Agricultural Officer, and

evaluation officer and the REDSO Agricultural Officer will conduct this monitoring. It is also anticipated that the short-term consultants will make a contribution to annual monitoring and evaluation analyses through their written reports to ISABU, the AAO and the project Team Leader at the end of each consultancy.

3. Mid-Term Formative Evaluation

At the end of year three an external evaluation will be conducted by a team of two or three members financed by short-term consulting funds provided under the project for a total of three work months. The task of the team will be to assess and identify any problem areas and make recommendations for possible design adjustments. In particular, the evaluation should assess the implementation rate of the participant training program and the recruitment of professionals employed by the U.S. Contractor. The evaluation should assess GRB participation and make recommendations to address any noteworthy situations. The team should also give a preliminary indication of whether a second phase of the project appears justified and, if so, propose directions for a longer term AID role in agriculture in Burundi. As such, the mid-term formative evaluation will probably be the most important and substantive evaluation phase during the project life.

4. End-Term Summative Evaluation

Five and a half years after project evaluation, there will be a thorough assessment of the project. This evaluation might be timed to immediately precede, and serve as a basis for, the Project Paper for a second five-year phase of the project. An ex-post evaluation will be held seven years after project authorization.

V. CONDITIONS, COVENANTS AND NEGOTIATING STATUS

1. Conditions Precedent

Only standard provisions will be used for conditions precedent to initial disbursement as conditions precedent to the disbursement of funds for the construction of facilities. The GRB will be required (1) to furnish evidence that suitable sites have been selected and land provided for construction and field testing plots at Murongwe and Karuzi, (2) to provide in advance of the disbursement of funds for construction, appropriate plans and specifications, cost estimates and time schedules for construction; and (3) to provide AID with a current list of pesticides and herbicides being used by ISABU in its trials both at experimental stations and on controlled plots. Information to be furnished should include generic names, manufacturers' environmental data, recommended tolerances and rate and frequency of application.

2. Covenants

The Grant Agreement will contain the following convenants:

a. The GRB agrees to provide appropriate supporting professional personnel on a timely basis.

X51

b. The GRB agrees that housing constructed under the project will be used exclusively by AID-financed advisors in this or subsequent projects until or unless AID otherwise agrees in writing. In addition, the GRB will rebuild and renovate buildings at Karuzi for project use.

c. The GRB agrees to make available qualified candidates for long-term academic training in the U.S. and agrees to ensure by bonding or other means that these persons are assigned to the same or other suitable positions as mutually agreed upon within MOAL, for a period equal to at least twice the period of training financed under the project or longer. In addition, all participants for non-degree programs of 18 months or less, and M.Sc. participants already working for the GRB will receive salaries and benefits to support their families in Burundi while they are receiving training abroad.

d. The GRB agrees that all equipment, including vehicles, procured under the project will be used exclusively for project activities, and that the use of all vehicles, excluding motorcycles, will be under the direction and supervision of the U.S. Team Leader and the MOAL Director of Agriculture, or their respective designees.

3. Negotiating Status

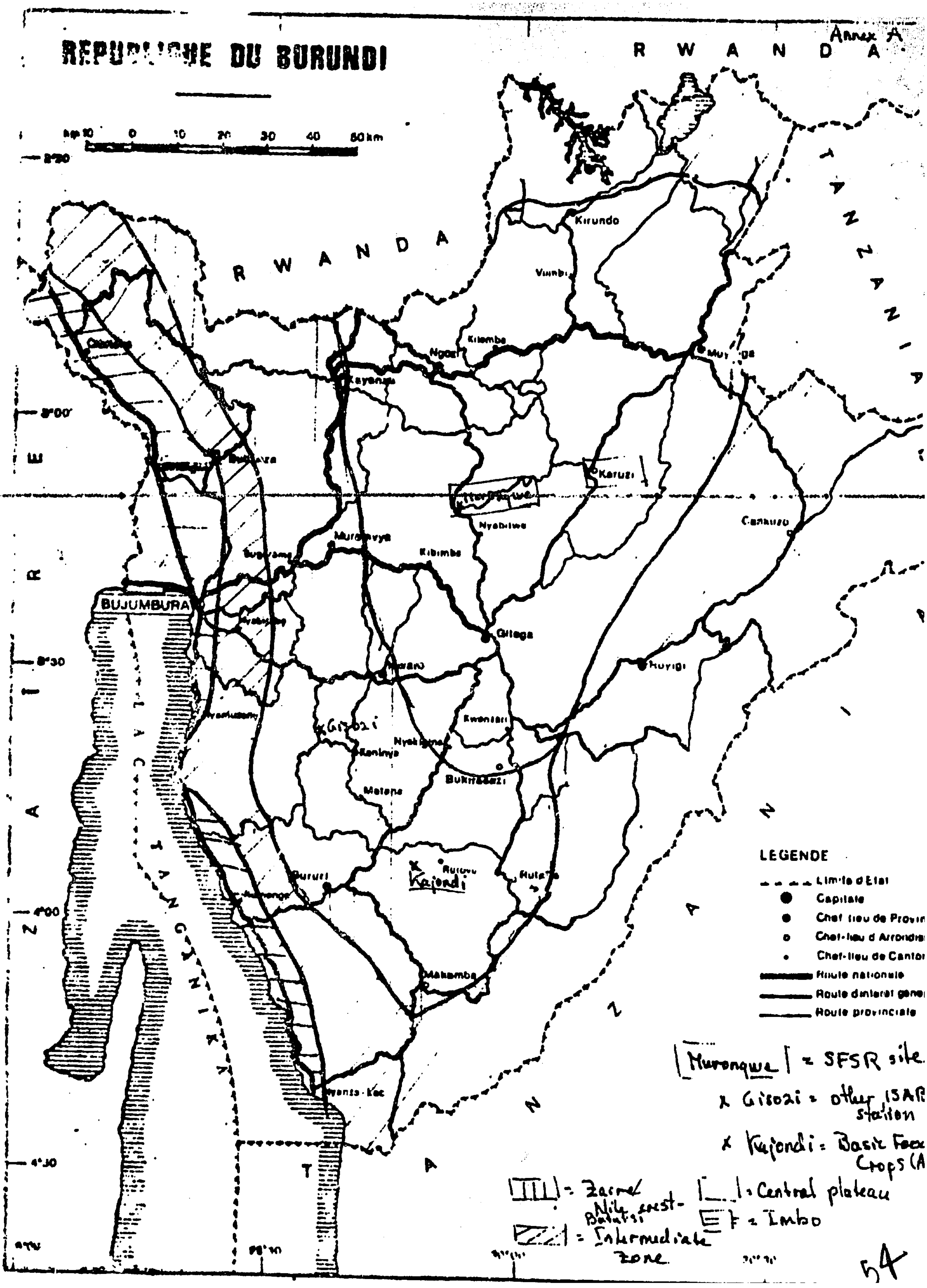
In designing this project, the PP team met almost daily with the Director General of Agricultural Research Institute (ISABU) who will serve as the GRB Project Director. The team received excellent support and cooperation from the ISABU Director and his staff, who participated in almost all planning sessions and field trips. In addition, the PP team met several times with the MOAL Director of Agronomy, and just prior to its departure from Burundi, the team briefed the Minister of Agriculture and Livestock and gave him an executive summary of the project.

The PP update team had several meetings with the Director General of Agriculture Research Institute (ISABU), Director of Agronomy, Director of ITAB, Director General of Agricultural Planning, University staff and the new Minister of Agriculture and Livestock.

Based on these numerous contacts the AAO feels confident about the GRB's understanding of and support for the project. A key factor in its success will be the degree of responsiveness by MOAL in terms of providing Barundi support personnel both as professional project staff and as candidates for overseas training. The GRB is mindful of this requirement and pledges its full support.

ANNEXES

Annex A



REPUBLIQUE DU BURUNDI
RWANDA
TANZANIA
ZAIRE
LAC TANGANIKA
Kirundo
Vumbi
Kiremba
Ngozi
Muyinga
Kayanza
Karuzi
Nyabiowe
Cankuzo
Muramvya
Kibimba
Bugarama
BUJUMBURA
Gitega
Muyinga
Mwaro
Ruyigi
Kwentari
Nyakigina
Matana
Bukirasazi
Bururi
Rutovu
Rutana
Makamba
Nyanza-Lac
LEGENDE
Limite d'Etat
Capitale
Chef lieu de Province
Chef-lieu d'Arrondissement
Chef-lieu de Canton
Route nationale
Route d'interet general
Route provinciale
Murongwe = SFSR site
x Gisozi = other ISAR station
x Kajondi = Basic Food Crops
Zaire Nile crest
Buhosi
Intermediate zone
Central plateau
Imbo

54

Country: Burundi

Project Design Summary
Logical Framework

Project Title: Small Farming Systems Researc
Project Number: 695-0106

NARRATIVE SUMMARY GOAL:	OBJECTIVELY VERIFIABLE INDICATORS:	MEANS OF VERIFICATION:	IMPORTANT ASSUMPTIONS:
To assist the GRB in developing agricultural institutions that provide relevant technology leading to improved nutrition and welfare of small farmers.	Increased cereal/legume/tuber food crops production in project area. Greater cash income for participating farmers. Improved health, as measured by fewer nutrition related diseases.	Commune agricultural production statistics. Morbidity statistics.	Agricultural research and extension will continue to be high priorities of GRB. Weather conditions and rainfall during the life of project will be sufficiently close to normal to avoid distortion of research results and testing.
PURPOSE: a. To strengthen the GRB institutional linkages between the agricultural research and extension organizations and the farming community, and to upgrade the professional skills of the Ministry of Agriculture's research and extension staffs. b. To provide the farmers of Burundi with relevant innovations in agricultural production technology and methods through farmer training, field trials and demonstrations.	END-OF-PROJECT STATUS (EOPS): a. (1) Better trained agricultural technicians working on applied agriculture research and extension within the farming systems framework. (2) Communication mechanism in operation between farmers and research/extension workers. (3) ISABU collects and analyzes farm level agricultural and farming systems data according to established methodology. (4) ISABU conducts research directly applicable to small farms. (5) Extension service's outreach capacity is strengthened in project communes and methodology is established for future replication. (6) ISABU research results. (7) Improved capacity to produce high quality seed for distribution to farmers.	USAID reports and records. Reports and records of MOAL Department of Agronomy. Project Evaluations. Research design documents. ISABU records and reports. Contractors records.	Sites selected will prove to be representative of the ecozone chosen, and methodologies developed will be replicable in other areas of the country. Cooperation and coordination will continue to improve between ISABU (research) and the MOAL Extension Service.

OUTPUTS:			
a. Better trained staff in ISABU and Extension services who work on applied agricultural and farming systems research.	a. (1) Staff trained at B.Sc. plus or M.Sc. level: - 5 agronomists - 2 agricultural economists - 2 microbiologists - 3 extension specialists (2) Others: - 4 lower level technicians - 240 extension agents at all levels. (3) 8-10 other ISABU researchers.	a. Reports and records of ISABU research station. b. Reports and records of MOAL. c. Project records. d. Surveys conducted under project. e. Evaluations. f. Research design documents in ISABU. g. Field surveys.	-Staif made available for training (ISABU and extension). -Extension and research staff work together and are motivated to work with farmers. -Extension staff and enumerators have logistic backing. -Farmers agree to cooperate and provide needed data. -Farmers to put into practice technologies and methods introduced under the project. -Researchers modify their experiments designs according to farmers priority problems. -Effectiveness of Extension service will be improved by regular in-service training of monitors and increased mobility provided by vehicles, motornikes and bicycles supplied under the project.
b. Mechanism established and in operation to provide two way communication between farmers and research/extension workers.	b. (1) Extension information on new technologies reach farmer during testing process. (2) Farmer fully involved in testing process. (3) Feedback from farmer on problems/possible improvements fedback through extension/research staff to ISABU scientists. (4) Farming systems research and extension division established and staffed.		

56

c. Methodology established and in use for collecting farm level agricultural information and farming systems data.	c. (1)ISABU and ART staff determine types of information media and develop methodologies for formal and informal surveys. (2) Surveys conducted under ISABU and ART supervision. (3) Analyses of results done by ISABU and ART.		
d. Improved capability of ISABU to conduct research directly applicable to small farms.	d. (1) ISABU uses information obtained from surveys to determine priority needs for research. (2) ISABU conducts research experiments designed to solve these problems.		
e. Strengthened outreach capacity of the extension service in project communes with methodology established for replication elsewhere.	e. (1) Trained extension people working in a systems approach with trained farmer demonstrators. (2) Management system is appropriate given logistic support capabilities. (3) System is tested and approved for use in other areas.		
f. Greater acceptability by small farmers of ISABU research results.	f. Using a through farmer tested relevant technology developed from research results are available and accepted by farmers.		
g. Improved capacity to produce high quality seed for distribution to farmers.	g. ISABU produces farm tested varieties of breeder seed for further seed multiplication.		

INPUTS:	MAGNITUDE OF INPUTS:		
a. U.S. Government: (1) Technical Assistance - long term: - Research agronomist - 4 yrs - Agricultural economist-4 yrs - Extension specialist - 4 yrs - Operation specialist - 5 yrs Short term advisors On campus support	a. U.S. Government: (1) Technical Assistance - long term: (a) $2,110,000 - 17 work years (b) Short term consultants - 44 work months, $653,000 (c) On campus support - 105 work months, $275,000	a. Records and reports of TA team. Audit reports.	a. (1) (a) GRB will assign qualified staff as project counterparts. (b) Contract staff (long and short term) can be located promptly with adequate language capability and willingness to live up country
(2) Training (a) Long term M.Sc. - 204 months (b) Other long term - 168 months. (c) short term - 205 months (d) research grants	(2) Training (a) M.Sc. $340,000, 7 participants - agronomy, agricultural economics, extension and soil microbiology. (b) Other long term, $280,000 4 post license specialization 5 post ITAB specialization. (c) short term third country, $155,000 - Nine people of international research centers, etc. (d) research grants, $160,000	(2) AID records plus transcripts and reports of participants.	(2) Qualified Burundi degree candidates with adequate English can be identified and released for training. (b) Returned participants will be retained by the GRB and effectively utilized in appropriate positions.
(3) Commodities	(3) Commodities, $298,000 (a) vehicles $110,000 (b) ART field equipment $30,000 (c) Seed equipment $41,000 (d) Office equipment $47,000 (e) Household furnishings $70,000		(3) Commodity procurement and shipping procured in timely fashion.

INPUTS:	MAGNITUDE OF INPUTS:		
a. U.S. Government: (1) Technical Assistance - long term: - Research agronomist - 4 yrs - Agricultural economist-4 yrs - Extension specialist - 4 yrs - Operation specialist - 5 yrs Short term advisors On campus support	a. U.S. Government: (1) Technical Assistance - long term: (a) $2,110,000 - 17 work years (b) Short term consultants - 44 work months, $653,000 (c) On campus support - 105 work months, $275,000	a. Records and reports of TA team. Audit reports.	a. (1) (a) GRB will assign qualified staff as project counterparts. (b) Contract staff (long and short term) can be located promptly with adequate language capability and willingness to live up country.
(2) Training (a) Long term M.Sc. - 204 months (b) Other long term - 168 months. (c) short term - 205 months (d) research grants	(2) Training (a) M.Sc. $340,000, 7 participants - agronomy, agricultural economics, extension and soil microbiology. (b) Other long term, $280,000 4 post license specialization 5 post ITAB specialization. (c) short term third country, $155,000 - Nine people of international research centers, etc. (d) research grants, $160,000	(2) AID records plus transcripts and reports of participants.	(2) Qualified Burundi degree candidates with adequate English can be identified and released for training. (b) Returned participants will be retained by the GRB and effectively utilized in appropriate positions.
(3) Commodities	(3) Commodities, $298,000 (a) vehicles $110,000 (b) ART field equipment $30,000 (c) Seed equipment $41,000 (d) Office equipment $47,000 (e) Household furnishings $70,000		(3) Commodity procurement and shipping procured in timely fashion.

(4) Construction	(4) Construction, $774,000 (a) Guest houses $203,000 (b) Technicians houses $305,000 (c) Training centers $229,000 (d) Engineering (5 perc.) $37,000		
(5) Other Costs	(5) Other Costs, $571,000 (a) Project Administration $170,000 (b) House rental $90,000 (c) Vehicle Maintenance and fuel $161,000 (d) Expendible supplies $64,000 (e) Field Survey Teams $69,000 (f) Crop Insurance Fund $40,000 (g) Miscellaneous Research Expenses $20,000		
(6) Contingencies (10 percent)	(6) Contingencies $566,000		
(7) Inflation (12 percent compounded)	(7) Inflation $1,568,000		
(8) Grand Total	(8) Grand Total $7,790,000 rounded to $7,900,000		
(b) GRB Inputs (1) ISABU Personnel (including all benefits)	(b) GRB Inputs (1) ISABU $391,700 (a) Senior Staff $179,000 (b) Technical Staff $83,500 (c) Driver and secretary $15,200 (d) Laborers $104,000		(1) GRB can locate staff. (2) GRB allocates sufficient funds for recurrent costs and renovation. (3) Land is made available.
(2) MOAL Personnel (including all benefits)	(2) MOAL $201,500 (a) Senior Staff $36,000 (b) Technical Staff $21,000 (c) Monitors $136,500		
(3) Salaries of overseas trainees, subtotal all personnel costs	(3) Trainee salaries $93,200 $668,000		
(4) Reconstruction/renovation	(4) Reconstruction $345,000		
(5) Land - 250 hectares	(5) Land $122,000		
(6) Utilities	(6) Utilities $15,000		
(7) Total Cost (including inflation and contingency)	$1,546,000		

SMALL FARMING SYSTEMS RESEARCH PROJECT

(695-0106)

ANNEX C-1 : PID APPROVAL CABLE

ANNEX C-2 : PP REVIEW CABLE

SMALL FARMING SYSTEMS RESEARCH PROJECT (695-0106)

ANNEX I

PID APPROVAL CABLE

(80) STATE 215636

SUBJ; PID REVIEW : SMALL FARMING SYSTEMS RESEARCH - BURUNDI

1. Bureau review on July 11 approved subject PID. Review committee found PID clearly written and well thought out, especially from technical standpoint. Certain non-technical areas, in particular institutional relationships and sociological factors, are also considered in PID but in less detail. Since these collateral areas likewise may be determinative of project success, PP should deal with them thoroughly, as discussed below, as well as elaborate research methodology.

2. Institutional considerations. Project as envisaged in PID involves heavy dependence on both agronomical sciences Institute of Burundi (ISABU) and extension service. As for ISABU, it is to be source of improved varieties and agricultural techniques for testing under farm conditions; and it is to incorporate results of farm testing into its experiment program. This will require close ties with project personnel. Care should be taken that relationship is accepted not only by Burundian personnel in ISABU but also by expatriates financed by Belgian assistance, who according to PID constitute major ISABU component.

Response: Both the Burundi and the Belgians working in ISABU accept and welcome the working relationship. See Annex L - Zalla Report Section A.2.

3. Extension service, for its part, will be key to replication of results achieved in testing areas. Yet as described in PID, extension service has glaring weaknesses, PP should specify basis for expecting these to be overcome. Presumably training will be major part of assistance directed to this end. Training program, which should provide for ISABU as well as extension service needs, should take full advantage of opportunities in other Francophone African countries. Nature of in-country training contemplated should be detailed in PP.

Response : As much training as possible will take place in Africa, with Kenya, Cameroon and Nigeria as major sites. In addition, we are requesting that M.Sc. theses be done in Burundi. See Section II.C.1.b;

Section II.A.5, Annex E Annex K and L (Both Zalla and Ferguson). Details of in country and on the job training program curricula will be set up by GRB and contractor based on needs and survey results.

4. Linkages of project with ISABU and extension service are prime consideration. Location of project administratively in ISABU, as contemplated in PID, would foster project -ISABU connections. On other hand, it would make development of ties with extension service more difficult. Possible solution would be to have one long-term project advisor responsible for liaison with each entity. Question of ties between ISABU and extension service themselves, particularly in period after project conclusion, should also be thoroughly dealt with in PP.

Response : PP resolves question by having project within ISABU in new division of Farming Systems Research and Extension. Extension personnel are attached to ART on secondment. Research committee, which approves research plans, includes extension and university representatives. See SectionI.D; IID; IIIA; III B; III D; V A; Annex F K and L.

5. Socio-ethnic considerations. PID rightly emphasizes importance of sociological factors to success of project. In this connection full-time assignment of sociologist/anthropologist to project seems preferable to reliance on short-term consultants. Nature of incentives to farmers to participate in testing of varieties and techniques under project auspices needs to be specified and their adequacy established. PID notes potential difficulties in having male extension agents work with cultivators, who are predominantly female. Evidently extension agents would have to work across ethnic lines as well. Believe that explicit consideration should be given to this problem also.

Response: Barundi speak one language and have one culture. The Murongwe area has already been studied in detail by Socio-economists during the preparation of the IDA Kirimiro project study was done by local firm. We have analyzed the question regarding full time anthropologist several times and have decided each time that a full time socio-anthropologist is not necessary for the life of the project. To be effective, the person must be a Kirundi speaker since very few people in Project area have any French or Swahili. The individual would also run out of work after a year or two unless he/she carries out extension or production economist roles as well. Since Barundi social scientists are available locally it is preferable to use them whenever possible. The agriculture extension advisor should have had some exposure to rural sociology. We have specified that it would be highly desirable for the Agricultural Economost to have additional training and/or experience in rural sociology (specifically in the culture and social organization of African societies). This

individual will have considerable experience in soci-economic survey design and analysis, and therefore will be able to advise Barundis working on sociological analysis. There is plenty of flexibility in short term consultancies to allow for TDYs of sociologists. Section II.D sets forth project mode of operation. Aspects of extension are discussed in II.A, B and D, including how to reach women. It is highly probable that, most of the extension workers and enumerators, at the rank of assistant technician or below as well as nearly all women who work on the project, will live in the project area before recruitment. Section V, and Annex E, F and H also discuss this question.

6. Coverage. PID included soil conservation and livestock elements in project but only in third and fifth years, respectively. Systems approach, on the other hand, would seem to require consideration of all elements together. Suggest that conservation and livestock elements be introduced in first or second year of project.

Response: Given limitation of AID financial resources and acute GRB shortages of trained personnel the PP update team decided that soil fertility and farm soil conservation measures should be tackled from the start. Livestock will always be included as a component due to the need of organic compost, and consideration will be given to perennial tropical legumes which can be used as livestock feed. (See Section III A and Annex E). However, a specialized experimental small animal livestock component will not be added until year 4, after the mid-term evaluation.

7. Country contribution. If GRB contributes less than 25 percent of cost of project, as anticipated, waiver of section 110A will be necessary. Accordingly, PP should examine financial constraints on GRB and make critical analysis of sufficiency of GRB contribution and of GRB commitment to project.

Response: See Sections IV and V(especially negotiating status) and supplementary budget information in Annex K.

8. Environmental considerations. Current IEE and negative determination acceptable for information gathering and institution building only. Extension and research components will require IEE with pesticide risk-benefit analysis if pesticides are to be procured and/or used. See regulation 16 for details.

Response: See Annex I with revised IEE.

9. Break-point. Proposed duration of project is five years. Further, its success is dependent on non-technical, I.E. institutional and sociological factors as well as technical ones. Believe, therefore, that break-point should be built into project design, whereby in second or third year project will be reassessed and decision made on continuation to conclusion.

Response: See Section V.C.3 regarding mid-term formative evaluation.

X6A

ANNEX C-2

PP REVIEW CABLE 82 STATE 132706

1. Core Project Committee met on May 4 to discuss issues raised concerning PP for subject project at previous committee meetings and also further developments reflected in refs B and C. Conclusion was that several issues still needed to be resolved and review and reorientation of project such as envisaged in ref C would be appropriate, following are issues regarded by the committee as primary. Others are included in draft memorandum being handcarried in AAI and to REDSO/EA by IDI Ruybal. Efforts to locate technical assistance such as required in ref C are being continued.

2. Sector strategy. CDSS concludes that eventual effectiveness of future development programs in Burundi hinges upon understanding the milieu and establishment of extension systems and supply and distribution networks. Research, even such as envisioned in subject project is not given explicit priority. Further, Annex D page 3 of PP itself describes constrations on agriculture including illiteracy, landlocked location and small size of country, lack of public services and insufficiency of facilities for rural transport, marketing and credit. There is no discussion of why it is better to do this project than to address other constraints. PP should deal with these apparent discrepancies. It should also show linkage with other projects, in particular basic food crops, as well as with other donor activities. How are these supportive of the project? Are constraints identified in the CDSS and Annex D being addressed by other AID projects and/or by other donors?

Response: Please see Section I, Section III.A, Annex E and Annex L of PP.

Please see FY 1985 CDSS Update for Burundi Section II.A on agriculture strategy. Burundi must increase yields to increase production due to limits on land availability. This requires coming to grips with soil fertility problem and making sure that research results are transferred to the extension services, so that the extension staff has relevant, tested recommendations to make to farmers.

3. Manpower/recurrent costs : In order to demonstrate optimum utilization of AID's investment in this project, a more in depth analysis of GRB's ability to absorb recurrent costs is necessary. This includes discussion of the government's ability to sustain proposed project sites and replicate (spread effect) in other areas of the country, the activities to be initiated in this project. What indications are there that GRB's ag manpower resources can meet the short term demands being made upon it by this project and the long term demands required by replication of the ART/FSR methodology on other areas of the country? It should also be pointed out that the recurrent cost budget in the PP does not allow for continuation of training, data gathering and other functions of the ART's on the project sites and the initiation of these activities outside the project sites.

See Annex A and L on economics and recurring costs, plus Section IV

See Section IIC and III A and IV on training and management. Most mid-level staff will be recycled agriculture extension people, and ITAB technicians. There are about 40 new graduates of ITAB a year, and 49 full technicians and 149 assistant technicians already in the Department of Agronomy. Women will be recruited locally and from the Foyers Sociaux.

For more senior staff, the project will rely primarily on recruiting and retraining Licence Sciences and Licence Economiques and Sciences Sociales graduates, to get around the problem of the lack of Ingénieur Agronome trained people.

ISABU is gradually increasing its Barundi staff and priority will be given to farming systems research.

We anticipate that the first replication outside of the project described in the PP will be for high altitude zones near Kisozi. The Kisozi station already has five L./Science or IA Level Barundi, plus seven ITAB staff. The station is well developed and equipped. Construction requirements are minimal and even commodity requirements will be very small.

4. Economic/social analysis. The economic analysis is weak. On a macro level the sectoral rational for research intervention should be made recognizing the difficulty of undertaking an ex-Ante analysis of the benefits on a micro level, so rough protection should be attempted. More important, real alternatives should be examined in the cost effectiveness analysis (one site versus two or more, residence in Bujumbura versus on the station, use of existing structures versus construction, cost per training day of the school, etc.). The broad assumptions in para 2 page 29 point out the need for a clearer indication of Government committment and the need for policy analysis.

Response: See Section I, II.D, II A and C, IV,V. Also Annex E, F,G, K and L. The project has tried to make maximum use of nearby school facilities, particularly at Karuzi (only construction there is a dormitory for instructors). Murongwe will require some buildings however. The nearest ministry of agriculture facilities where boarding is available outside the school year is 30 kms. away and it will not have the observation/research plots or nearby farmer demonstrations.

The Ministry has formally requested that technicians live at the project site. This is the GRB rule regarding research technicians and applies to all nationalities. The one way trip is 2 and a half hours from Bujumbura to both sites part of it over very steep mountain roads, with frequent rain and fog. This makes commuting impossible from Bujumbura. We hope to locate housing at Gitega (where it is very scarce) until construction is completed. Project staff will still have to spend 1 and a half hours driving the round trip each day to project sites from Gitega.

Septel follows on other points.

x66

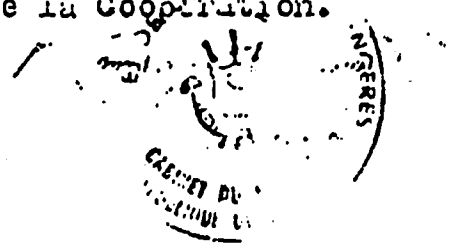
5. It is not altogether clear that there is common agreement on what we mean by farming systems. Perhaps one way to get at this is to have a better statement of just what is going to be done under this project.

Response: See 82 State 223940 and 82 Nairobi 16810.

Réf. N° 710/102/62.

A Monsieur le Représentant
de l'USAID
à BUJUMBURA

Sous-couvert de Monsieur le Ministre
des Affaires Etrangères
et de la Coopération.



Monsieur le Représentant,

J'ai l'honneur de porter à votre connaissance que le projet "Recherche sur les systèmes agricoles au niveau des petites fermes" peut en principe démarrer.

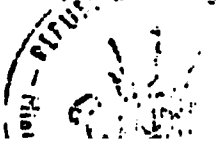
Toutefois, la recherche devra d'abord être envisagée à la Station de Karuzi et au Centre de Murongwe avant tout essai en milieu rural et cela pour prévenir des éventuels échecs au niveau du fermier.

Le budget prévu au dossier de projet devra être modifié en tenant compte des investissements de recherche à réaliser à Karuzi et à Murongwe.

Aussi, j'ose espérer que ce projet pourra contribuer à l'accroissement de la production agricole dans la région de Karuzi et de Murongwe et sera également une occasion pour former notre personnel technique à tous les niveaux ainsi que les fermiers bénéficiaires de ce projet.

Veuillez agréer, Monsieur le Représentant, l'assurance de ma considération très distinguée.

Le Ministre de l'Agriculture
et de l'Elevage,



168

REPUBLIC OF BURUNDI
MINISTRY OF AGRICULTURE AND LIVESTOCK

Bujumbura, 30 October 1982

abinet of the Minister
ef. No. 710/1097/82

AID Affairs Officer
Bujumbura
through Minister of Foreign
Affairs and Cooperation

ear Sir,

have the honour to inform you that the Small Farming Systems
esearch Project can, in principle, begin.

irst, however, research should be undertaken at the Karuzi
tation and at the Murongwe centre before any trials in rural areas
n order to avoid possible unfortunate failures at farmers' level.

he budget planned in the Projet Paper must be modified to take into
ccount the investments for research that will be carried out at Karuzi
nd Murongwe.

lso, I hope that this project will be able to contribute to the
rowth of the agricultural production in the Karuzi and Murongwe regions
nd will as well be an opportunity to train our technical personnel at all
evels as well as the farmers benefitting from this project.

closing formula)
lease accept, Mr. Representative, the assurance of my very distinguished
onsideration.

Minister of Agriculture and Livestock
Alexis Ntabikiranya

ANNEX E

Technical Analysi

CONTENTS

TECHNICAL ANALYSIS

The following discussion supplements the technical analysis in the text of the paper.

A. Adaptive Research Team (ART)

The concept of the Adaptive Research Team (ART) is proposed in this project to provide Burundi's agricultural research institution (ISABU) with a means of directing its resources to the most important production constraints of small farmers. The strategy of the ART places heavy emphasis on the "bottom up" approach in assessing production constraints. The initial action of the team will be to examine existing farming systems and to assess their potential for improvement. Once areas of potential technical change are identified it will be possible for ART members to communicate farmer needs to ISABU for further research.

1. Stages of Work

The work of the ART consists of four stages (See Schematic Framework

a. Descriptive or Diagnostic State - At this stage the actual farming system is assessed in its entirety, to determine the major constraints facing the farmer and the flexibility the farmer has for making changes in such areas as planting dates, labor utilization, availability of domestic resources and other inputs. Special attention will be given to female-headed households at this stage of investigation. The team will also evaluate farmer goals and motivations for changing existing practices.

b. Design Stage - The ART will use information obtained in the diagnostic stage to define research priorities and to identify a range of technologies relevant for dealing with current production constraints. The improved techniques identified in this stage are to be tested later under actual farm conditions. Changes suggested in the farming system at this stage will involve recommending relevant technology already developed by researchers, borrowing technology from other farmers in the area, as well as passing on information about production constraints to the research station Appropriate tests may be conducted at research stations before passing on to farmers. Whatever recommendations are made to modify the farming system will take into account already proven technology that is ready for testing at the farm level. The major activities at the design stage are to be carried out on the experiment station, taking into account information acquired about farmers' production constraints and priorities.

c. The Testing Stage - At this stage the adaptive research team will begin to test a few of the most promising and advanced improved technologies identified in the design stage and available at the research stations. The purpose of the testing stage is to determine the suitability of the improved technology and its acceptability at the farm level. The tests must be done under material and management conditions like those of actual small farms. They must not, for example, rely on more purchased inputs than most area small farmers can afford or have access to. The farmer himself is an essential

resource in assessing and evaluating the suitability of technology as improvements are considered for the testing phase. The testing stage is divided into two phases. The first phase is trials on farmers' fields conducted jointly by the farmer, research agronomist, extension staff and the agricultural economist. The later phase of farmer testing is where the farmer takes full control, with assistance from the extension staff.

d. The Extension Stage - the extension service of the Department of Agronomy will be responsible for implementing through demonstrations and other means, successful improved technologies identified in the earlier design and testing stages. The technology being disseminated will be based on knowledge acquired during the test trial period. There are not always clear-cut distinctions between the various stages. It is possible for example, for the testing to begin during the diagnostic stage. This is sometimes possible due to the body of knowledge that already exists at the research stations, but has not yet been tested on the farmers' fields.

At this stage, the farmer interacts directly with the extension and research staffs, providing the channel for feedback to the research station. The extension stage also plays an important role in redefining research priorities on the basis of information from farmers. Consequently the extension service staff become central to the adaptive research team work.

2. Structure of ART

The MOAL has proposed Mutaho(Murongwe) and Bugenyuzi(Karuzi) Communes as the areas where the adaptive research activities will begin during this project. It is intended that ART will function along the following lines.

a. There will be one ART in each commune comprising an ISABU agronomist and agricultural economist, as well as an extension specialist from the Department of Agronomy assigned to the ISABU ART, with an overall coordinator located at ISABU headquarters.

b. Based on the commune focus of each ART it will be possible to cover a wide range of farming systems. The ARTs will develop close working relationships with the Murongwe and Karuzi research centers and seed multiplication units. This working relationship will help ISABU establish research priorities and provide to ARTs improved technologies for testing on farmers' fields.

c. The extension specialist, as part of the ART, is the focal point linking research and extension. The specialist will be responsible to the Head of the Farming Systems Research and Extension Department at ISABU that will work closely with the Director, Department of Agronomy, from which he will have been transferred on secondment. He will have a strong background in agronomy. The extension specialist will cooperate closely with the provincial Agricultural Coordinator and the staff of subject matter specialists in the province of Citega.

The research agronomist and agricultural economist will also be responsible to the Head of the FSRE Department at ISABU, who will be appointed by the Director General of ISABU as the senior of the two. Operational management of the ART, including responsibility for budget and commodities, will rest with the head of the FSRE Department.

3. Functions and Staffing of the ART

The adaptive research work of the Ministry of Agriculture will directly influence the formulation of agricultural research priorities and will serve as a technique for bringing together the research and extension institutions. The specific functions of the ART will be the following :

a. Research: interaction with the farmer and ISABU in setting forth research priorities.

b. Extension: delivery and evaluation of agricultural technologies through liaison with the extension service, as well as the farmer feedback process established by having the extension staff serve on the ART.

c. Information: dissemination of agricultural technology found during the testing stage to be directly applicable to small farmers, and incorporation of this technology into the extension information program for distribution to farmers.

d. Training: the provision of technical agricultural information to training institutions.

e. Participation: direct involvement of farmers in the [illegible] and feedback process intended to improve the direct applicability of agricultural research.

The ART is primarily concerned with research and extension. However, as the program establishes itself, the potential exists for the concept to play a larger role in accelerating agricultural development throughout Burundi through the spread effect. As techniques are developed in this pro they will be replicated elsewhere, both in a possible second phase of the project and thereafter.

Initially, the U.S. technical assistance team will provide on-the-job training in production economics to five ISABU staff members who will later be assigned to ARTs. The agronomy and extension members of the ARTs will also receive in-service training, as described in the research and extension sections of the Technical Analysis. When participants return from the U.S. with degrees and assume their roles in the project, they will take over the training function. Another important training component in this project will be the seminars in farming systems offered at CIMMYT/EA and IITA. The ART will also provide assistance in conducting in-service training for the Ministry of Agriculture and Livestock extension staff.

4. PROPOSED ART METHODOLOGY AND WORK PLAN

The project proposes to use the International Maize and Wheat Improvement Center (CIMMYT/EA) farming systems methodology for ART work. There will also be experimentation with a few slightly different approaches.

X73

for the following reasons:

a. The Mutaho Commune will be the first fully operational ART in Burundi.

b. CIMMYT/EA as yet has had little experience with the testing stage of the adaptive research program.

c. Unlike earlier CIMMYT methodology which concentrated on looking at one crop in the farming system, the ART in Burundi will have a broader perspective which involves looking at several major enterprises, thereby complicating the methodological issues.

d. Some methodological and data processing innovations, particularly at the testing stage will be provided by the agricultural economist.

Overall, however, it is recognized that the Nairobi CIMMYT office has gone farthest in developing the type of farming systems methods essential to this project.

In view of the current evolution of thinking in the Ministry of Agriculture concerning the methodologies to be employed by the ART it is perhaps premature to draw up a definitive work plan. Therefore, at this stage the following suggestions should be considered tentative:

a. The team members should work in an interdisciplinary mode at all stages of the research process, although the input of the extension specialist will become critical in the later stages.

b. In the descriptive and diagnostic stage it is anticipated that, apart from incorporating questions about a number of different crops, the exploratory survey and the one-shot verification survey methodology advocated by CIMMYT can and should be employed.

c. The criteria for the design of appropriate technologies can also closely follow that suggested by CIMMYT.

d. The possible value of experimenting with different approaches comes at the testing stage. Differing approaches could be used in different communes. While the general approach to on-farm trials and farmer testing would remain the same, differences are possible in terms of the frequency and the scope of the data collected. Accurate and relevant data are required for evaluating the potential value to farmers of the results of the on-farm trials and farmer testing. Two criteria for determining the scope of and frequency with which data are collected are the lowest possible cost commensurate with the degree of understanding necessary, and compatibility with the fairly limited resources that the Ministry of Agriculture is likely to have available in the future. This will require considerable skill. Possible approaches to look at are :

(1) Two levels of sample: a large one in which single point registered types of data are collected at infrequent intervals, and a smaller one in which continuous non-registered types of data are collected at frequent intervals.

(2) For the small sample there might also be two possibilities: first, data collection by activity on major enterprises and second,

few case studies in which data would be collected on the whole farming stem. The AID-assisted Agricultural Research and Extension Project n Zambia starting up in 1981 may provide some useful experience pplicable to the Burundi project. Clustering samples and close inks to the farmers' testing are also important in reducing costs. n conjunction with CIMMYT ideas on the testing stage, experience gained ether East and Southern Africa countries could be useful in designing st effective approaches for on-farm trials and farmers' testing.

e. Part of the work plan should include monitoring the option process once the technology thought to be relevant is passed on the extension service for dissemination to farmers.

f. The training functions discussed in the preceding section will viously be an important part of the work plan.

CROP RESEARCH

Researchable Problems

The SFSR project will concentrate only on those crops predominant the project communes and required by farm families for subsistance. ese include beans, maize, sorghum, manioc, and sweet potatoes. This mbination of crops will provide a basis for a crop rotation system ilizing legumes as a substitute or supplement to nitrogen fertilizer cereal and tuber production for sustained food production.

tercropping, or the growing of two or more crops simultaneously a plot of ground, appears to be a common practice in the area now. et is not know is the ratio of one crop to the other to give maximum oduction. For example, can manioc and sweet potato tuber production increased by growing them in association with a legume crop? What the effect of shading on beans by the manioc or maize? Does the taller op need to be space planted so as to reduce shading?

rticular varietal characteristics will be required. Climbing bean ants supported by maize or sorghum may perform better than bush ans by producing leaves of a level unaffected by shading. Short, ni-dwarf maize plants with early maturity and upright leaf habit y be more desirable in an intercropping system than tall varieties. rrent farming practices include intercropping of bean and sorghum. an and maize, sweet potatoes and maize and most of these food crops e grown in association with bananas. Intercropping requires some ecific considerations not utilized in monoculture. Considerations st be given to the economic value of the individual crops. It is not common for the yield per hectare of each crop to be reduced from the eld by monoculture. However, the labor requirements or value of the mbined crops, or need to maintain ground cover, or the desirability of roducing two food crops may be more important than having two fields. Labor requirements of intercropping may be less than monoculture r seed bed preparation and weed control. Varieties must be compatible growth cycles, or seeding dates must be adjusted to provide harmonious owth patterns. Seeding rates of both crops may have to be adjusted accommodate competition which occurs between interplanted crops.

The applied research team will assist the ISABU researchers in identifying the best adapted varieties for seed multiplication at the Murongwe and Karuzi seed centers. Seed from these centers will be made available to the extension service for on-farm trials and demonstrations in the project area. Farmers will be encouraged to retain seed from their demonstration fields for their continued use and to sell it to neighbors for extending the use of a new technology.

The utilization of legumes in a cropping system is a well known means of increasing the nitrogen content of the soil and reducing the need for the application of commercial fertilizer. This is successful only if the leguminous crop is being innoculated by the proper rhizobium bacteria giving the plant the ability to fix nitrogen from the air. Initially it will be necessary to innoculate the seed with a commercial preparation. After a successful crop has been produced, sufficient natural innoculum remains in the soil to make artificial innoculation of subsequent crops unnecessary. Crop species and soil environment can influence the type of innoculum required. Screening of innoculum types on local crops will be required research in the early stages of the project. To promote this important concept of reduced nitrogen requirement, the project has provided funds for a short term micro-biologist consultant to assist in identifying the proper rhizobium innoculum. It will also provide long term U.S. training for M.S. level participants in this field to assure a continued program.

The project provides funds for short term training of agents at international agricultural centers such as IITA and ICRISAT where cropping system training programs involving tropical crops are available. Participants would be sent to these centers early on in the project to instruct them in methods of devising cropping system programs.

2. Progress in Agricultural Research

ISABU's 1981 and 1982 annual reports indicate that a body of research results is available, and that portions of it, although not yet well tested in that zone, are likely suited to the ecological conditions in the Project area. The suitability of a particular variety or a cropping practice will need to be verified by on-station tests at Murongwe or Karuzi before making on-farm test demonstrations.

The research approach utilized by the Department of Crop Production ISABU, is essentially a screening and testing program of selected imported varieties of locally grown food crops. However in the case of maize some crossing and selection was done in 1981. The varieties tested are mostly from countries located in the tropical latitudes and having similar ecological conditions. The performance of the imported varieties is measured against that of local types. In the screening process yields are given first consideration closely followed by disease and insect resistance, and length of growing season.

Following are brief summaries of progress in the search for better food crops varieties, during the period 1980-1982.

In 1979 and 1980 variety trials were made at ten different altitudes ranging from 830m to 2200m to determine the optimum range of altitude for each variety under test.

These altitude tests resulted in the following recommendations for maize:

Altitude	Variety
800 - 1,250m	GPS5
1,250m - 1,500m	GPS4 x SR52
1,500m - 2,000m	Igarame - 4
2,000m	Kitale

The best varieties for Murongwe, and Karuzi based on altitude are Igarame 4 a local variety, and GPS4 x SR52. Kitale which has a very long vegetative cycle is recommended only for altitudes in excess of 2,000m, where the yields are up to one third greater than Igarame-4.

In addition to the research on maize mentioned above under the Belgian assistance program, maize research also received support under the Canadian technical assistance program in 1980 and 1981. A total of 51 varieties from a wide geographic range of sources were tested at four ISABU stations including Murongwe (alt. 1,470 m). For medium altitudes which would include Murongwe and Karuzi, these tests identified the following four varieties as worthy of further testing: PMC-4, PM-210, Chiteoze CA and Ferke 7622. Yields of these varieties at Murongwe were 7.48, 7.05, 7.30 and 7.27 tons per hectare respectively.

In 1981 a total of 32 varieties including 30 from CIMMYT and a locally produced hybrid were retained for further testing in 1982.

Wheat and Triticale

Extensive testing of introduced varieties of wheat and triticale were carried out in 1979-1980 and 1981. CIMMYT supplied the following five international nurseries including 1,086 selections of wheat and triticales: Screening Nursery for African Cooperative Wheat Yield Trials (SNACWYT), African Cooperative Wheat Yield Trial (ACWYT), Second Preliminary Triticale (2ndPrTel), International Bread Wheat Screening Nursery (IBWSN), and International Triticale Screening Nursery (ITSN).

Nine yield trials of wheat were planted using standard field plot designs and data analysis techniques. Chemical fertilizers were included in the study with a single dose of 60-120-60 units/ha of N, P and K given to all fertilized plots. A top dressing of 40 units of N was applied at the tillering stage.

ISABU research has found several varieties of both wheat and triticale which are well adapted to the higher altitudes, but, for satisfactory yields large doses of fertilizer must be applied. For example, the triticale variety T74, the standard variety in a trial at Kisozi, yielded 5.46 tons/ha when N, P and K were applied at the rate of 60-120-60 units per hectare. The untreated plot yielded only 1.51 tons/ha, or only 27.7 percent as much as the fertilized plots. The response of wheat to fertilizer has been comparable. For example Romany, the standard wheat variety, yielded 3.61 tons/ha when fertilized, but only 2.23 tons/ha with no fertilizer.

Grain Sorghum

Three selections from Kenya and two local varieties were planted at Murongwe in replicated yield trials. The tests were harvested but yields were not reported in time to be included in the report.

Beans

Beans are the major food crop in Burundi and research on them received major emphasis in 1980 and 1981. A total of 168 different varieties from world-wide sources were planted in screening and production trials. In 1981 the total number of entries in the bean collection increased to 215. In addition to yield, the introduced varieties were tested for susceptibility to insect and disease attack, length of period to maturity, density and date of seeding, and performance at different altitudes.

Definitive trials to determine the best varieties for different altitudes were carried out with seven bean varieties retained from previous screening programs. At Murongwe (1,450 m), in the project area, yields varied from 1,129 kg for variety 0688 Colorado to 1,926 kg for Diacol Calime. This test confirmed the suitability of Diacol Calime for altitudes between 1,200 and 1,900 m.

Mixed cropping of maize and climbing beans was studied at Revira (1,900m). Of the nine varieties received from CIAT, only one variety Colabozo yielded more than Cuarentin 817, the standard variety, with 608 and 439 kg/ha, respectively.

Although well-adapted varieties have been found, a suitable method for processing them into an edible form acceptable to the local population is yet to be developed.

Tubers

Research on white potatoes in 1981 included variety trials, dates of planting fertilizer response, method of planting, and spacing.

Three varieties Kenya Baraka, Muhabura and Sangema have been released to the Department of Agronomy for multiplication for the 1982 planting season. Potatoes are a rather new crop in most of Burundi but demand for seed has been increasing each year.

A serious problem encountered in the testing program seems to be bacterial blight which has attacked varieties which are susceptible to that disease.

Sweet Potatoes

Seven varieties were studied in trials at three locations including Murongwe. Yields at Murongwe varied from 5.9 for the lowest yielding variety to 20.1 tons/ha for a Nsasagatebo, a variety with a 10 month maturity period.

Seed Multiplication

The Crop Production Department, Division of Food Crops multiplied selected varieties of the following crops for use by the Ministry of Agriculture as follows :

Crop	Varieties
Corn	GPS5, GPS4 x SF52, Mutwenzi, Igarama-4, Kitale
Wheat	Romany
Triticale	T.4
Sorghum	SVR3, SVR157, 5D x 16J Dobbs
Beans	Karama Var. 0.5, Diacol Calime
English Pear	Kyondo
Soybeans	Palmetto
White Potato	Sangerma, Kenya Baraka
Sweet Potato	Caroline Lee, Margonda
Manioc	Cuolinha, Bitawisi, Nakarasi

Industrial Crops

ISABU's coffee program includes research for cultivars adapted to the different ecological conditions, improvement of cultural techniques and fertilizer trials. The tea research program includes varietal trials and tests to determine fertilizer requirements. Quinquina research include investigation of grafting stocks, sites for cultivation and performance trials. Cotton research concentrates on improving quality while maintaining yield. Work on sugar cane consists primarily of varietal tests.

Livestock

Production research by the Department of Livestock included mapping the natural rangeland of the Bututsi region, and determining the carrying capacity of the natural range of the Mosso and lower Buziri. Other research concerned the role of Pennisetum in native pasture, research into improved pasture yields and the effect of manure and mineral fertilizer on forage crops. Research on cattle includes improving growth rate, milk production, fattening, and artificial insemination.

Soil Survey and Mapping

The pedology section in 1981 continued to develop the resource bank of Agro-pedologic (Soil Management) information for annual crops, industrial crops and forage and pasture crops. In addition soil maps of varying scales were published of several different areas of the country. These were usually accompanied by land capability maps with interpretative text.

Forestry

The growth in circumference and height of 31 entries in a forest tree introduction nursery at Kisoni was followed in 1981, as in previous years. In addition special studies were carried out on the management of Pinus patula, one of the most promising introduced timber species.

Rural Sociology and Economics

The Department of Rural Sociology and Economics conducted a detailed survey of on-farm storage in three regions (including Kirimiro). The data have been sent to Europe for processing and computer analysis. The Department has also begun study of the agro-economic potentials of several regions and the complementarity between agricultural production of different regions.

Plant Protection

The Department of Plant Protection continued to work on the problem of insects that attack maize, sorghum, sugar cane, coffee, and cotton; and crop disease problems, particularly those affecting potatoes, maize and coffee.

3. The Karuzi Basin: Its Climate and Soils[x]

The Karuzi basin is located in the North East of Burundi at 3° South latitude and 30° East longitude. It covers 780km2 with a relatively steep relief especially in the southern half where the crest reach an altitude of 1,850 m.

Observations and measurements made during the period 1958-1961 are the basis for the following climatic data. It should be noted that a three year period is relatively short for obtaining good averages.

The annual rainfall on the basin is 1,175 mm (average of 25 stations), normally falling between September 15 and May 15. However, there is great irregularity in the amount and time of rainfall. Rainfall can be intense. Forty-six mm were measured in one hour and 173 mm in one 24 hour period.

The average annual maximum daily temperature is 26.3°C and the average daily minimum is 13.8°C. The minimum can be especially low during the dry season with -4°C recorded in a valley position.

Soil moisture capacity varies from 150-215 mm. Drying of the soil profile is moderately rapid at the beginning of the dry season and by the end of one month about one third of the soil moisture has been lost by evapo-transpiration. At the end of the dry season there is normally plus or minus 20 mm of water in the soil profile. This may explain the rapid greening of the hillsides after the dry vegetation is burned.

The evapotranspiration of the savannah lands was about 1,213 mm or three percent more than the rainfall.

In the grassland areas water runoff is generally modest on slopes of less than 25 percent except where the soil has been compacted by the trampling of cattle, or on burned land during the early part of the rainy season. Mixed cropping on soils of less than 25 percent slopes usually is adequate to protect the soil against runoff and erosion.

The essential soil forming process in the Karuzi basin is laterization

x Information in this section is mainly from "Archives de la Mission de la Karuzi", Vol.1, Service de Publication d'Assistance Technique, Ministère des Affaires Etrangères et du Commerce Extérieur, 7 Place Royale, Bruxelles.

of the soil profile. The process is characterized by a concentration of iron and aluminum oxides, moderately high clay content of the kaolinite type and a low percentage of silt size particles. When moist the soils are generally friable but during dry periods they become superficially hard and resist plowing or hoeing. The soils are moderately to highly acid and low in exchangeable bases and in phosphates.

Extensive areas of hill land are not adapted to crops but should be left in grass and shrubs or planted to trees. In these areas thick hardened laterite crusts may be present presenting an obstacle to cultivation or tree planting. The best upland soils are those with modest slopes (less than ten percent) and at least one meter in depth. Organic matter content is moderate but decomposition is rapid when put under cultivation and organic manures must be included in the cropping system to maintain productivity.

The soils of the valleys in their natural condition are poorly drained and ill suited to crops. They are usually high in organic matters and plant nutrients and with proper drainage are well-suited to crops requiring high fertility such as corn and vegetables.

The report concluded that "only on those soils which are supplied with organic matter can chemical fertilizers be used with profit", a conclusion which agrees with the opinions expressed by a number of expatriate and local agronomists interviewed.

The following rainfall and humidity data although recorded only over a three year period indicates the year round climatic conditions in the Karuzi area. The figures are averages from 25 rain gauges throughout the zone :

Month	mm	Month	mm
January	146.6	July	0.0
February	132.2	August	10.6
March	170.6	September	38.4
April	220.1	October	111.1
May	71.1	November	107.1
June	0.3	December	168.9

Total 1,175

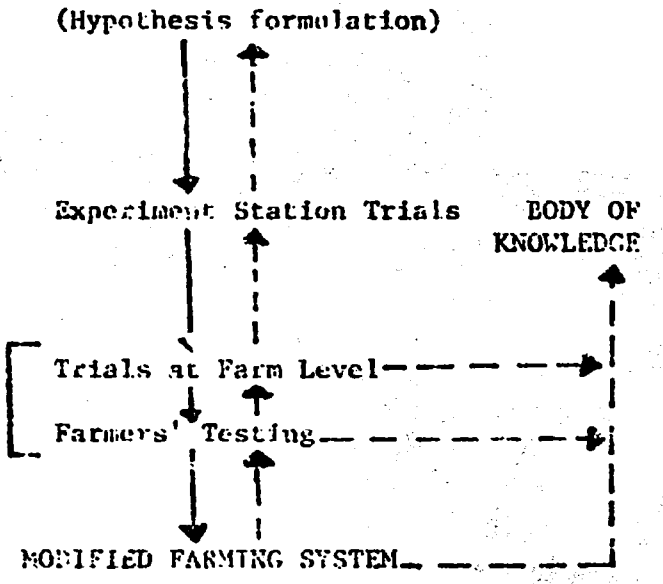
The average monthly relative humidity during the day and at night are as follows :

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Day	72	77	77	77	64	56	47	45	51	56	69	7[illegible]
Night	91	93	93	9[illegible]	90	79	63	61	69	79	88	9[illegible]

SCHEMATIC FRAMEWORK FOR ADAPTIVE RESEARCH TEAM

ADAPTIVE RESEARCH STAGES

1. Description or diagnosis of present farming systems
2. Design of improved system elements
3. Testing of improved system element
4. Extension of improved system element



ANNEX F - INSTITUTIONAL ANALYSIS

The Scientific Agricultural Institute of Burundi (ISABU)

ISABU is a semi-autonomous research organization receiving policy guidance from the Ministry of Agriculture. It is organized into five technical and one administrative division. Field research is carried out at five principal stations (six counting Bujumbura where the Land Development and the Socio-Economics sections are located), and five smaller centers which are dependent upon professional help from the research station. The policy is to have a research station or center in each of the important ecological regions of the country. These regions are largely defined by altitude, temperature and rainfall. see Figure F-1 for an organization chart of ISABU and the table below for the locations of the professional staff. ISABU has the responsibility for all research in Burundi relating to agriculture, livestock and forestry.

The ISABU organization dates back to the colonial period when all agricultural research in the Belgian Congo and Rwanda-Urundi was the responsibility of INEAC [1] with its vast network of major research stations, centers, and testing sites. INEAC was entirely built, staffed and financed by the Belgians. Although ties to that organization no longer exist, ISABU is still largely dependent upon Belgian aid for professional staff and certain operating costs.

In addition to Belgian aid, Canada provides a specialist in corn and bean research and the International Potato Center provides a potato research specialist who divides his time between Burundi and Rwanda.

ISABU is not working in isolation. It has linkages with the CIMMYT supported plant breeding institute at Njoro, Kenya and with INTSOY, FAO IBPGR, CIP and ICRISAT. In addition ISABU in 1981 obtained selected planting materials from 16 different countries in Africa, North and South America and Western Europe.

Although six or eight years ago ISABU research focused mainly on the cash crops (coffee, tea, cotton, sugar, etc), the emphasis now [illegible] food crops as discussed in Annex E, Technical Analysis.

Research Stations

Bujumbura

Director General Engineer Agronome (IA)
Agronomist Soils (IA)
Agronomist (IA)
Agronomist (IA)
Agricultural Technician
Economist Lic. Economy
Animal Health Veterinarian

[1] Institut National pour les Etudes Agronomiques du Congo.

Plant Scientist Lic. Biology
Agricultural Technician
+ 8 ITAB graduates
x Expatriates - technical advisor, administrative coordinator plant protection, phytopathology laboratory, land development/ management (5), sociologist, economist, coffee (one phytopathologist and one plant scientist).

Kisozi

Director, Lic. Botany
Agronomist (1A)
Agronomist Lic. Biology
Agronomist Lic. Botany
Agricultural Technician (maize)
+ 7 ITAB graduates
x Expatriates - cereals, forestry, maize/peas.

Kisoga

Director, Lic. Biology
Agronomist Lic. Biology
Agronomist (1A)
Agronomist (1A)
Agronomist Lic. Botany
+ 4 ITAB graduates
x Expatriates - legumes

Nyirona

Director Veterinarian
Agronomist (1A)
+ 3 ITAB
x Expatriates - range management/pasture

Mukoko

Director (1A)
Agronomist (IA)
+ 1 ITAB
x Expatriate - pasture

FEMS - IMBO

Director Agricultural Technician
+ ITAB
No Expatriates

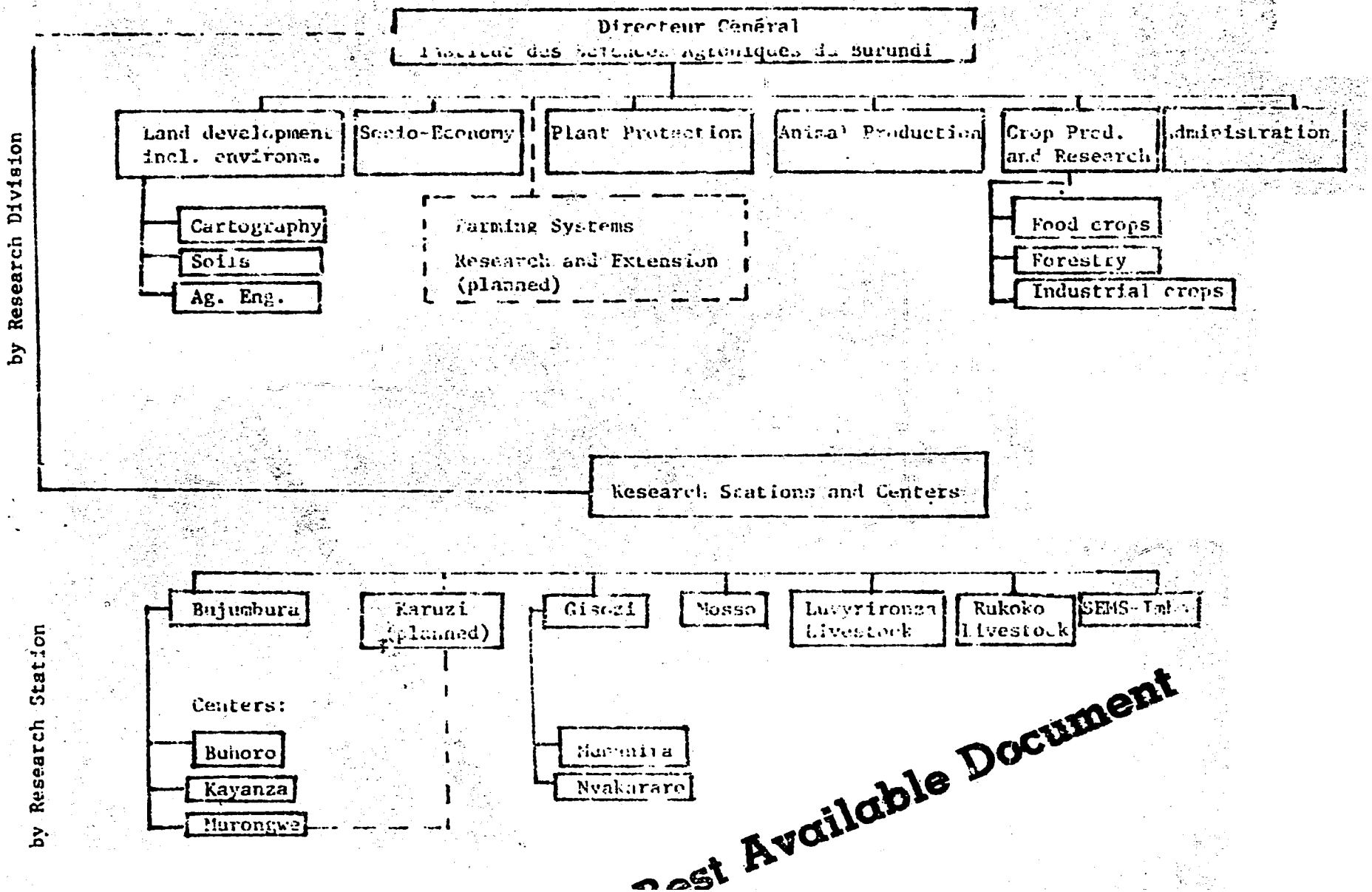
Research Centers

Mwokora Center

1 Agricultural Assistant

ANNEX F-1

Organigram of ISABU



Mparnge Center

2 Agricultural Assistants

Nyakararo

Buhoro

Muramira

Mpure Farms

Karuzi Station

Director.
Deputy Director
2 Researchers (one agronomy, one economist)
1 Extension/Training
x Expatriates - SFSR in last year of project
2 researchers, one extension/training

Murongwe Center

1 agronomist/researcher
1 Extension/Training.

...ndi's major weaknesses fall in two categories; personnel and techni... ...research is dominated by expatriates because of the lack of Burundi tra...ed ...the higher levels (M.Sc. or Ph.D.). It seems unwise for Burundi, in the ...run to continue to depend on expatriates to fill key positions in ch... ...ical areas as food crop, livestock and socio-economic research.

The Government of Burundi has recognized the need to accelerate training at the higher professional levels and in 1975 established a Faculty of Agriculture which graduates "Ingénieur Agronomes" (equivalent to the M.S. level). This was an important step toward reducing the deficit in highly trained manpower.

The second area of weakness we have identified is the need for a more effective system for transfer of research results into farmer practice. This project is intended to address that problem by establishing procedures and methods for developing a closer working relationship between research and agricultural extension.

Economic Analysis

The economic analysis annex contains additional information on agriculture in Burundi and the project area. Reviewed are (i) agriculture and Burundi's economy; (ii) constraints on agriculture (iii) agricultural prices; (iv) farm budgeting in project area; (v) crop research focus of the project (vi) cost effectiveness; and (vii) recurrent costs and replication.

A. Agriculture and Burundi's Economy

Agriculture is Burundi's most important economic activity. Over the last few years, it has accounted for about 60 percent of Gross Domestic Product and provided almost all of the foreign exchange earnings, with coffee contributing about 90 percent. During the same period, food and beverage imports accounted for about 15 percent of the total value of merchandise imports. Most of these imports, however, have been for the small, upper income urban market.

More than 90 percent of Burundi's population derives its livelihood directly from agriculture. Most of the rest are directly or indirectly dependent on it for employment. The bulk of the population lives in dispersed rural homesteads (rugos) where they farm with a subsistence orientation. Nationally, the average farm size is about one hectare scattered among several fields. In the project are (central plateau) the rugos range from 0.4 to 0.8 hectares due to the high average population density (see Table 1). A majority of farms are able to grow more than one crop per year per field. Table 2 presents a production calendar for foodcrops in Burundi. Compiled by the MOA's Department of Agronomy, three production seasons per year have been identified if one includes crops grown in marshes during the dry season. Typically, most Burundi farmers have two cropping seasons per year.

Table 3 , presents the major ecological zones, locations, and crops. The SFSR project focuses on the central plateau area which encompasses abou 35 percent of Burundi's land area and roughly 50 percent of its population.

The food crops produced vary with elevation, soil, rainfall and other factors but beans, maize, cassava, sweet potatoes and sorghum are important in all provinces. Bananas are ubiquitous except at very high altitudes. In addition to being the mainstay of this subsistence oriented economy, foodcrops also represent the single most important source of money income for farm families. The sale of banana beer is the single most important cash generating foodcrops. Overall, less than 10 percent of all foodcrops production is marketed. Export crops, primarily coffee, provide about 20 percent of average rural families' cash income.

Yield estimates of Burundi's major food crops for the last five years are shown in Table 4. Burundi agricultural statistics should be treated with more than the usual amount of caution. Figures published and adjusted by various GRB ministries often vary by 250 percent. Several trends, however, do emerge. Production

has increased over the decade, with manioc registering the largest increase, both relatively an absolutely. Manioc made up about 45 percent of the total tonnage of t e five major crops (excluding bananas) at the beginning of the d cade, but made up roughly 60 percent of the total in the last two ye rs.

Crop production, p rticularly of tubers, has been highly variable from year to year. Are s of most of the crops have also varied widely, but changes in area do not explain the variations in production. Yields also vary greatly. Som of the yield variation appears to be a trend toward decline, which cou d be related to expanding cultivation into more marginal areas. Th s could also be depressing average yields.

Burundi's food pro uction situation is further exacerbated by its expanding population, growin at a rate estimated at between 2.0 and 2.7 percent. The average popula ion density, using the 1979 census, is 161 people per square kilometer. Population densities vary with some areas averaging about 370 inhabita ts per square kilometer. The area affected by the project is more densely po ulated than the average for Burundi. Continued increases in population at u abated or even increased rates are projected. Food production increas s over the last decade were insufficient to keep pace with population. The p r capital availability of domestically produced food has declined nd is still declining. A decade ago, according to estimates, daily f od intake in Burundi averaged about 1900 calories per capita, compar d with needs of 2100 and 2200 calories. The nutritional situation appears o be critical and getting worse. Wheat imports equivalen of 12,878 metric t ns went almost entirely to the urban areas and to relatively small P 480 Title II and WFP programs, thus having relatively little impact on t e rural population. Unfortunately Burundi's balance of payments is in dif iculty. Transport is a major problem and the probability is slight that exp rts can be increased sufficiently to finance extensive food imports. In ddition, imported food is unlikely to have a significant effect on the diet of rural people or urban poor, who have neither access to such food nor mone to pay for it.

Thus, it is impera ive that food production and the efficiency of food production be incr ased in the rural areas.

B. Constraints on Agriculture

Most agricultu e in Burundi is in the private sector; state operations are lim ted to a few coffee and tea plantations having a minor share of total productio . Private capitalism in agriculture operates under constraints.

The low level of l teracy among rural people and their dispersed settlement pattern place cons raints on dissemination of information about new technology. Newsp pers and billboards in the public square may be less effective here tha in some places. There are, however, transistor radios. Furthermore, the G B has undertaken massive efforts in education during the past four years to ard improving literacy in the local language (Kirundi) and reorienting th basic education curriculum to make it more relevant to the ru al milieu.

Another constraint which will not change is Burundi's landlocked location and her heavy abse ce of petroleum resources. This virtually precludes

a heavy reliance on heavy or bulky imported materials or on chemical fertilizers.

Other constraints (reviewed in the CDSS) exist with respect to a) the insufficiency of arable lands and the small size of the farms combined with population growth which increases pressure on the land; (b) the lack of adequate services , in erosion and degradation caused by the cultivation of steep slopes, poor farming practices, inadequate anti-erosion measures, burning of agricultural residues and grass, overgrazing, little or no fallow practice and the lack of fertilizer application; (d) marketing; (e) rural transportation and (f) unavailability of credit to facilitate purchase of needed inputs.

All these factors have contributed to a decline in subsistence foodcrop production per capita over the last decade and a worsening of the already poor nutritional status of most of the rural population.

C. Agricultural Prices

The impact of the project on agricultural consumer or producer prices or marketing will be minimal in the short term. Its impact in the long term will be a function of the farming system improvements developed by the project that are adopted by Burundi's small producers. Nevertheless, a review of prices is useful in showing the trend of rising prices and declining rural terms of trade for virtually all goods.

Consumer food prices in Bujumbura, Gitega and Ngozi are provided in IBRD project analyses for Ngozi and Kirimiro. Nearly all of these prices trended upward. Other data series going back to the mid-1970's reveal increases averaging 10-12 percent with the most recent years averaging over 15 percent.

Producer prices are presented in Table 10. A price index for foodcrops is presented in Table 11. The same trends in consumer prices can be seen. Analyzing the producer prices data series in the same papers show a worsening terms of trade for rural areas relatively to urban areas. The effects of price increases for locally uncontrollable reasons, evident even in this small sample, support the national goal of food self-sufficiency in Burundi's money scarce economy and help further explain Burundi farmers subsistence orientation.

D. Farming Budgeting

Studies of the allocation of land and labor among crops, and of returns to resources as allocated, can reveal much about the organization of farms and their potential for improvement. The studies of farms in Gitega and Ngozi provinces completed by the GRB, however, are not sufficient to draw definitive conclusions. They are useful in providing a more detailed background of the area the project is working in. Table 5 presents a farm budget for the typical family in the project area for one season. Labor requirements per crop in the project area are not known.

These budgets are only generally indicative of the situation in the SFSR project commune. However several observations are relevant:

1. The apportioning of land among the various crops is complicated. For the present the budgeted area must be realistic for the farming systems being utilized.

2. Out-of-pocket costs of production are very low. Although no expenses are shown for seeds, according to other research work a few farmers are purchasing seeds in particular and sometimes other inputs, usually for coffee.

3. There is a wide range in profitability of the crops shown. The greatest profit, both per hectare and per day, is for the crops that have the greatest production and value of production. However, minor errors in production or price data could seriously distort the results.

4. There is little connection between the measures of profitability of different crops and the resources (land, labor or other inputs) lavished on those crops. In other words, profit does not explain why they raise these crops in these proportions. Caloric value, protein content, family preferences as to taste, or the certainty of making a crop could possibly explain or correlate with resource mixed used better than profit. This is, not unexpected on a Burundi subsistence farm where the product is not for sale, the utility of the crop in feeding the family is more important than its market value.

5. There is presently insufficient labor data to evaluate the present farming system. The effect of resource reallocation such as using available labor to do a better job of weed control, or of raising more labor-efficient and high-yielding crops like potatoes and leaving some land unused, are among the areas that will be studied in the SFSR project.

6. Variations of yield data from IBRD and GAB sources illustrate significant differences which will have to be thoroughly examined during the SFSR project.

E. Crop Research Focus of the Project

In a commercially oriented, monetized economy, one would expect farmers or other entrepreneurs to engage in those activities and to produce those products that give them the greatest income. The economy of Burundi, and particularly of the rural people, is less than fully monetized and agricultural production is basically subsistence oriented.

Based on PP team observations and understanding of the people of Burundi and the milieu in which they live, it is believed that the local people are aware of the precariousness of having enough food, and that their attitudes and values lead them to give the highest priority to security and adequacy of food supplies. While this is a question to be resolved by research, perhaps in the context of this project it is believed that the rural people of Burundi strongly desire to produce more food for their own use, and that once their own needs are met they will be willing to sell their excess production. Thus, this project's

orientation to food crops in preference to and priority over industrial cash crops is very similar to the orientation of the rural people of Burundi.

There are indications that industrial cash crops (coffee, tea and cotton) and food crops normally sold (potatoes, beer made from bananas)do produce more income, both per hectare of land and per day of labor, than most subsistence crops. Certain other projects and activities in Burundi are attempting to exploit this relationship and to increase the area and production of cash crops.

The objectives of this project focus on food crops. The goal of this project, as stated in the PID (page 5) is "to increase the agricultural productivity of small farms in Burundi, thereby improving nutrition and food security and increasing income". While it is true that cash crops qualify as a part of the agriculture whose productivity is to be increased, cash crops are competitive with subsistence crops in that they complete for inputs land, and labor. Further increases in the area of land under cultivation can be had in most of the country only by using marginal lands. Techniques of production depend almost exclusively on hand labor, and much labor is required. It is expected that at critical times of the year all the available labor is fully utilized. Thus, increases in cash crops may come with a reduction of land and/or labor used for food crops. Assuming stable or increasing prices for cash crops, money income of the producers shifting to cash crops would increase. However, if many farmers shifted their emphasis, reduced supplies of food crops result in higher prices. The high food prices resulting from increased production of cash crops would probably offset the gain in income, and reduce the food security and the economic independence of the rural household.

Increases in cash income may still result from focusing on food crops. There is a ready domestic market at good prices for certain food crops. Expected increases in population and food production will permit families to divert a larger fraction of their output to the market place. Additional domestic food production can result in greater money income at both the micro and macro levels.

Cost Effectiveness and Alternatives to the Project

The PP review cable requested analyses of various alternatives to the project design. These included one site instead of two, having technicians live in Bujumbura, and having the University do the project.

1. One Commune Only

The establishment of farming systems research and extension requires a substantial core investment in research and support facilities, training in many disciplines, technical assistance in many fields, plus basic equipment.

Doing one commune only does not reduce project costs by half. It lowers them by about a fifth. Nearly all the technical assistance requirements remain, but give the iterative nature of the research program, the technical skills required are probably not fully employed once the commune level program has been in operation for about 18 months. This is especially true of the statistical and specialized technical staff,

x91

who will have time to start the process in another commune between periodic checks and review visits.

We estimate that it might be possible to reduce the TA team by one person for two years of the project, and short term TDY's might be reduced by a third. However contract support costs would dip less. This might reduce costs by about $550,000. Training requirements might be reduced by $110,000, while construction costs would drop by $305,000. Savings in other areas would be much less, perhaps $65,000 for all equipment and recurrent cost headings. The amount saved by eliminating Murongwe would be perhaps $1,130,000 compared with base costs of the present project of $5,650,000.

On the other hand, it must be remembered that Karuzi is located on the edge of the Central Plateau Ecological region and that it is slightly drier, with draughtier, soils than large areas of the Central Plateau, which has soils that retain moisture better. It is also atypical in that it has a much lighter population density than the rest of the plateau, and has considerable in-migration. Average farm size is quite large. Recommendations based on Karuzi alone may not be as effective in reaching potential beneficiaries as those which are also tested in the area of the Murongwe center, with its dense population, smaller farm size, slightly wetter regime and higher clay content in the soils. In addition, Murongve center, has sufficient facilities and results from existing research programs to permit initiation of work almost immediately upon the arrival of the TA team. It does not have the land or facilities to be the prime base of the program, nor does it have the advantage of the Agricultural School. It will require time, however, to get Karuzi developed sufficiently for the team to base itself there.

We have concluded, given the economies of scale that it is a more efficient use of AID and GRB funds, and especially of human resources, and to include two communes from within the same ecological zone in the project.

2. Basing Technicians in Bujumbura

It is suggested that basing the technicians in Bujumbura would reduce costs.

It should be pointed out that both sites are between two to two and a half hours away from Bujumbura (one way). This means that technicians cannot commute daily and would have to spend the week at the project site (which will require building elaborate transient housing). The cost reduction would be minimal.

Although it imposes strain on expatriate families with school age children now that the mission run English language primary school in Gitega is closed, the researcher is more effective in his work if he is living as close to the site of his research as possible (assuming that physical facilities are adequate).

The GRB requires that technicians and advisors assigned to an agricultural research station must live at the post of their assignment. This rule applies to Burundi nationals and expatriates.

92

3. Placing the Project under the University of Burundi

As mentioned above, placing the project under the University of Burundi would entail considerable upgrading of the Faculty of Agriculture. In practice, it would require establishing a research farm and laboratory in one of the more populous ecological zones that would in practice be nearly as expensive as relocating the Faculty. It would require considerable expansion of undergraduate training capabilities and the establishment of a graduate program before the Faculty of Agriculture could undertake farming systems research. The requirements in terms of time and money are probably at least double those set forth in this project.

It should also be noted that the University has rather tenuous links with ISABU and the Extension Service. It is under the Ministry of National Education.

The GRB has decided that agriculture research should be implemented by an autonomous institute under the Ministry of Agriculture and Livestock.

Recurrent and Replication Costs

1. Recurrent Cost Analysis

Table K-4 8 and 9 sets forth recurrent costs to the GRB of operating the project after completion. In year 6, costs include vehicle replacement and amount to $308,000 at present prices. The largest components are ISABU personnel costs ($132,600) and MOAL personnel costs ($81,000), while vehicles and maintenance, equipment replacement expenditures and utilities amount to $94,000. In years seven to ten, the costs exclude the new vehicles and drop to $282,600 per year. These costs apparently exclude the field survey teams, which will probably be substantially less than $17,000 a year.

It should be noted, because of retraining personnel, not all of these recurrent personnel costs are additional to the current operating budgets of ISABU and the extension services. Many moniteurs and some other staff will be taken over by the Farming Systems research program and ART's while their old jobs are phased out in the reorganization. We estimate that continuing components are about 75 percent for ISABU and 50 percent for MOAL.

These sums seem large, but it should be noted that ISABU's current operating budget was $926,857 in 1982 and the Department of Agronomy's is $2,580,000.*

2. Replication Costs (Rough Estimates)

If we assume that the third commune brought into the SFSR project system is in a different ecological zone (such as the Zaire-Nile Crest), but is next to a large, established agriculture research station such as Kisozi, the cost should be fairly modest. We will assume that research buildings, major equipment, station development and housing are available as well as research personnel working on station who can provide crop research backup. We will aslo assume that full time expatriate technical assistance will not be required, but that the third commune ART will benefit

* Excludes livestock, forestry and regional development corporations.

X93

from the people already trained under the project, plus about 16 months of short term consultancies ($237,000 in present prices). Estimated participant training costs are $150,000, while salaries paid to trainees amount to $52,000. Other capital and equipment costs would be for construction ($193,000), furnishings, office and class equipment, ART, field and seed equipment, vehicles, motorcycles and bicycles ($127,000). Total investment costs would be about $759,000.

Annual operating costs would be about $53,000 for ISAR, ART and MOAL personnel; $10,000 for field surveys, plus $30,000 for vehicle operation, crop insurance and miscellaneous expenditures, for a total of $93,000 per year (this should be maintained for three or four years).

Total cost would thus be $1,131,000 in 1983 prices over four years.

Establishing an ART in a fourth commune that worked out of a center (such as Rwegura in the northern end of the Zaire/Nile crest) and supplemented the work of the main station would cost approximately the same. (assuming some housing and other facilities originally used for dam construction can be taken over by the farming systems applied research program in addition to the limited facilities at Rwigira station itself).

Additional ART's should be replicated first where there is a sizeable population residing in the same major ecological region, and where there a substantial agriculture research installation in existence.

TABLE 7

POPULATION, AREA, AND DENSITY IN PROJECT AREA, 1979

Prov'/Communes (old subdivisions)	Estimated population	Area Km2	Density
1. Gitega/All Com.	687,990	3,447	196.1
2. Ngozi/All Com	777,330	2,707	285.1
3. Muyinga			
Gasorwe	39,900	196	203.6
Muyinga-Gashoho	41,790	165	253.3
Vumbi-Bujuba	49,350	204	241.9
Ntega	52,920	263	201.2
Kirundo	78,030	493	158.3
	261,990	1,321	211.6
4. Muramvya			
Kayokwe	32,210	123	261.7
Ndava	42,840	193	221.9
Kiganda	62,870	194	324.0
Mbuye	37,720	123	306.7
Nyabihanga	42,140	143	294.7
	217,780	776	280.8
5. Project Area Totals	1,940,090	8,251	240.4
6. Burundi totals	4,024,900	24,931	161.0

x95

TABLE 2

CALENDAR OF PRODUCTION FOR FOOD CROPS IN BURUNDI[x]

Months	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Climatic Season		Short rains			Little dry season		Long rains			Long dry season			Short rains	
Culture season		First Season					Second season			(Swamp agriculture) Third season				
AREA:														
Kajondi (Crest) (Rutovu)		Beans Maize Cocoyam Potatoes					Beans Peas Wheat S. Potatoes	Potatoes Sorghum		Beans Maize Sweet Potatoes				
Kisozi (Crest)		Maize Potatoes Cocoyam Squash					Peas Potatoes Wheat			Maize Potatoes				
Murongwe Central Plateau (Mutaho)		Beans Maize Cocoyam S. Potatoes	Manioc Sorghum				Beans Peanuts S. Potatoes Manioc	Soybeans		Beans Maize S. Potatoes				
Karuzi Central Plateau (Bugenyuzi)		Egg plant Beans Maize Cocoyams S. Potatoes	Manioc Sorghum Pineapple				Beans Peanuts S. Potatoes	Soybeans		Beans Maize S. Potatoes				

x Crops grown during the different seasons in four regions of Burundi per the Department of Agronomy "calendrier" for the 1977-78 program

Source : MOA, Dept. of Agronomy

TABLE 3

Major Ecological Zones, Locations, and Crops

Ecological Zones	Provinces Physical Territory	Physical Characteristics	Food Crops	Cash Crops
Imbo	Lake Tanganyka Shore and Ruzizi River plains	300-1000 m altitude, 22.5-25°C (average daytime temperature) 800-10,000 mm rainfall	Beans - 800 kg/ha Maize - 800kg/ha Sorghum - 700 kg/ha Cassava -6,000-8,000 kg/ha Bananas - 7,000kg/ha	Robusta coffee -1,200kg/ha (parchment) Cotton - 500kg/ha (seed cotton) Oil Palm Rice - 2,500 kg/ha(irrigated)
Medium Altitude Western and Eastern Zones	Lower edges of rift escarpment Muhinga, Mosso	1,000-1,500 m altitude 20-23°C (average day-time temperature) 900-1,200mm rainfall	Beans - 800kg/ha Peanuts - 500kg/ha (unshelled) Maize - 450 kg/ha Cassava - 5,000kg/ha Bananas - 7,000 kg/ha	Robusta coffee - 1,200 kg/ha (parchment) Sugar Cane (Mosso area)
Zaire/Nile Crest	Rwanda border through Muramvya Ijenda, Tora	1,900 - 2,500 m altitude 17-19°C (average day-time temperature) 1,300-1,600 mm rainfall	Maize - 450kg/ha Wheat - 410kg/ha Peas - 420kg/ha Sorghum/Millet 8 550 kg/ha Sweet Potatoes - 4,580 kg/ha	Tea - 900-1,500 kg/ha (made tea) White potato - 4,790 kg/ha Truck gardening
Central Plateau	Ngozi, Gitega south almost to Bururi	1,500-1,900 m altitude 19-20°C (average day-time temperature) 1,000-1,200 mm rainfall	Beans - 450 kg/ha Bananas - 6,500 kg/ha Maize - 400 kg/ha Sweet Potatoes - 4,000 kg/ha Cassava - (limited at higher altitudes) 4,500 kg/ha	Arabica coffee - 900-1,200 kg/ha (parchment)

Note : Depending on definition of ecological zone, some experts state Burundi may have up to eleven regions. The table above is somewhat arbitrary, but it does describe the broad basic types of climate and agricultural production.

TABLE 4

Production of Major Food Crops by Crop Year
(,000 metric tons)

	1976/77	1977/8	1978/79	1979/80	1980/81
Roots and Tubers	6,6[illegible].1	7,320.8	6,629.9	7,065.1	7,470.5
Manioc	3,81[illegible].9	4,318.8	4,492.1	4,752.1	5,339.[illegible]
Sweet Potatoes	2,19[illegible].1	2,735.1	1,787.8	1,938.3	1,672.4
Cocoyams Taro	51[illegible].3	238.7	317.3	332.1	258.[illegible]
Yams	1[illegible].0	4.8	13.9	18.5	19.[illegible]
Potatoes	10[illegible].8	23.6	18.8	24.0	81.[illegible]
Cereals	6[illegible].3	658.3	639.5	673.3	788.5
Maize	4[illegible].5	398.4	406.2	466.3	491.3
Sorghum	10[illegible].4	199.8	166.9	161.2	243.2
Finger Millet	[illegible]6.6	49.5	60.5	35.5	38.7
Wheat	[illegible].2	2.7	2.5	5.6	10.[illegible]
Rice (Paddy)	[illegible].6	7.9	3.[illegible]	4.7	5.3
Legumes	5[illegible].9	540.[illegible]	574.8	590.0	709.9
Beans	5[illegible].9	511.4	544.3	558.1	660.[illegible]
Peas	[illegible].5	19.[illegible]	19.8	32.1	37.[illegible]
Kajan peas	[illegible].8	9.7	10.5	7.4	11.[illegible]
Soybeans	[illegible].2	0.4	0.4	0.4	0.5
Oil Seeds					
Peanuts	[illegible]0.9	25.1	36.1	55.9	77.[illegible]
Total	7,9[illegible].0	8,545	7,870.1	8,392.3	9,045.9

Sources : Ministry of Agriculture and Livestock, Banque de la République

Note : We believe that these figures should be treated with caution.

... Subtotals may not add to totals due to rounding.

TABLE 5

Farm Production Single Season

Kirimiro Project : Before

	Areas in hectares	Yield kg/ha	Production FBu/kg	Price[1] FBu/kg	Value FBu
Beans	0,37	650	240	41	9,840
Maize	0.10	800	80	25	2,000
Sweet Potatoes	0.085	5,000	425	15.5	6,587
Groundnuts	0.02	600	12	68	816
Cassava	0.10	4,000	400	11.5	4,600
Sub Total food crops	0.675	na	na	na	23,843
Coffee	0.045	432	19	118	2,242
Total Farm	0.720	na	na	na	26,085

With Kirimiro Project 10 years later

	Area ha	Yield kg/ha	Production Kg	Price FBu/kg	Value FBu	Input Cost FBu	Net Value
Beans	0.37	1,000	305	59	17,995	2,934	15,061
Maize	0.10	1.300	130	32	4,160	1,586	2,574
Sweet Potatoes	0.085	6,500	553	15.5	8,572	-	8,572
Groundnuts	0.02	750	15	78	1,170	585	853
Cassava	0.10	5,000	500	11.5	5,750	-	5,750
Subtotal foodcrops	0.675	na	na	na	37,647	5,105	32,810
Coffee	0.045	606	27	183	6,405	1,100	5,305
Total Farm	0.720	na	na	na	44,052	6,205	38,115

Taken from Kirimiro project staff appraisal report

1) Before project prices on beans, maize, groundnut come from ISABU food storage study, 10 year later data from Kirimiro project.

SMALL FARMING SYSTEMS RESEARCH
(695-0106)

SOCIAL SOUNDNESS ANALYSIS

Project Sites - Agricultural and Socioeconomic Characteristics

The following briefly outlines economic and social characteristics of the two project sites selected by the PP team from among three proposed by the Burundi Government. The two sites are Murongwe Research Center in Mutaho commune and Karuzi agricultural school and research station in Bugenyuzi commune. Murongwe commune is in northern Gitega Province* in Burundi's densely populated central plateau region. Karuzi is in the newly formed Karuzi Province in northeast Burundi. It has lower than average population density. This region lies between the Congo Nile Crest on the west and lower altitude plains on the east. With altitudes averaging 1400-1500-1900 meters, the central plateau represents about 30 percent of the country's total land surface and is where just less than half of the population resides. Research results from the two project communes will therefore be applicable to much of the rest of the country.

Both Murongwe and Karuzi lie at an altitude of just under 1,500 meters, but Murongwe serves the central plateau zone, while Karuzi serves the adjacent flatter, slightly lower altitude eastern edges of the central plateau.

1) Murongwe Center

Murongwe is a relatively small agricultural research center in Mutaho Commune in northwestern Gitega Province. Mutaho is an area of traditionally high population density (321 persons per square kilometer according to the 1979 census). Its population is 74,770, of which 47.2 percent is male and 52.3 percent female. Mean annual rainfall in this area is approximately 1,000-1,300 millimeters and mean temperatures around 20°C. The average nuclear family household size is 4.3 persons and the average compound (ruga) is 6.1 persons. There are 38 collines in this commune, with colline populations ranging from 930 to 5,310 and an average of 1,968 persons per colline.

* Gitega Province is Burundi's fourth most densely populated after Bujumbura, Ngozi and Muramvya. Gitega has an average population density of 198 persons per square kilometer, greater than the national average.

Like much of the central plateau, Mutaho is characterized by hills, narrow valleys and a fairly dense network of streams and rivers. Many hilltops are bare of trees and are not cultivated due to erosion and poor fertility. Most families cultivate both hillsides and valley bottoms or marshes, with different cropping calendars for each type of environment. Potatoes, beans and maize are important valley bottom crops cultivated during the dry season. Two bean crops are produced per year on hillsides and a third in valleys or marshes. There is often only one annual crop of maize, sorghum and millet. Bananas and manioc are harvested throughout the year and, together with beans and sweet potatoes, form the major share of the rural diet in this ecological zone.

According to an August 1979 SOMEBU study, beans, sweet potatoes, manioc and bananas occupy 75% of the area cultivated each year in Gitega Province. Beans alone occupy nearly a third of the cultivated area. Field interviews near Murongwe indicated beans and cassava occupy the largest share of cultivated area. World Bank estimates are that each family in this area cultivates approximately 60-70 ares (20-25 ares per active adult).

According to the August 1979 SOMEBU study, more than 80 of the total area cultivated in Gitega Province is intercropped, with more than a third of the total cultivated area devoted to intercropping of three or more different crops.

Coffee (first introduced 30-40 years ago) is the major cash crop in the region. It is grown in very small quantities by possibly 85% of area farmers. Coffee comprises a tiny fraction (an estimated 4% in a 1968 SEDES study) of total cultivated area, and its production for most families is a second priority following production of enough food to meet subsistence needs

According to field interviews at Murongwe Centre, most small farmers earn an average of 5,000-10,000 francs ($56-112) per year from their coffee. They have an average of 100 trees per family and earn 100-110 francs (approximately $1) per kilo of coffee sold. A 1968 SEDES study in Gitega indicated each family had an average of only 60 coffee trees and that 79% of area farmers grew coffee. (The proportion of farmers growing coffee has since increased.)

The large proportion of farmers growing coffee is in part due to the fact that coffee growing was often compulsory, particularly when it was first introduced 30 to 40 years ago. Local chiefs sometimes used threats of prison or property confiscation to get individual small farmers to begin to plant coffee on their own land. This was considered necessary in order to overcome the initial suspicion and reluctance of small farmers to try the crop.

In addition to coffee sales, making and selling beer and charcoal are also significant income sources for many small producers in the area. Food crop sales are relatively minor and are generally in small quantities to help meet specific small consumption needs. Another small farmer income source in this area is male migration for off-farm employment, particularly since Gitega, the country's second largest town, is nearby.

Rural expenditure levels are quite low, but field interviews indicated commonly purchased foods include salt, palm oil for cooking, rice on special occasions, and some potatoes and peas. Common nonfood household purchases include soap, small quantities of kerosene for lighting, and supplies such as pencils, notebooks, and books for school children.

Most rural households own very few modern consumption items such as hurricane lamps, furniture, or kerosene and charcoal cookstoves. For lighting they depend upon small, tin, self-made lanterns which burn very small quantities of kerosene. For cooking, rural residents depend primarily on the three-stone fire.

There is limited and infrequent use of casual hired agricultural labor on small holdings, with wage rates of approximately 30-40 francs ($0.34-0.45) per day plus a meal, in the Gitega area. Communal labor in the form of relatives and friends working for each other in exchange for beer is perhaps a more common means of augmenting the family labor supply. Communal labor is often used for such tasks as house construction, as well as agricultural tasks such as weeding and planting.

Livestock production is far less important in Murongwe than it is in other areas such as Kisozi, due to both disease and scarcity of grazing land. While cultivation is on individually owned land, grazing tends to be communal. Pasture land available for communal grazing has declined greatly as a rapidly growing population has placed increasing demands on land for agricultural rather than livestock purposes. There are, however, small numbers of cows, goats, sheep and chickens and some pig raising (latter exists only in Ngozi and Gitega Provinces).

Barter remains a significant form of exchange in this area. It is common, for example, for agriculturalists to obtain their cooking pots from Twa pottery makers who exchange cooking pots for food crops.

X107

Overall, Mutaho Commune is representative of the type of agriculture and natural environment characterizing by far the largest share of both total population and land area in Burundi. It is important to note in this context that coffee production is widespread throughout much of the central plateau and represents 90 percent of Burundi's export earnings. Only a small fraction of export earnings, on the other hand, come from tea, which is grown in high altitude areas confined to a narrow belt atop the Congo-Nile Crest. Any improvement in the productivity of food crops grown by small coffee growers can have wide consequences for the general welfare of most of Burundi's rural producers. It can also indirectly improve coffee export earnings to the extent that improved food crop yields will make more land available for such nonfood cash crops as coffee.

Karuzi

Karuzi is the site of an agricultural school, livestock station, and planned agricultural research station. It is located in Bugenyuzi Commune, which borders on the east that which Murongwe Research Centre is located. Bugenyuzi is less densely settled (133 persons per square kilometre) than most Gitega Province, but it receives increasing numbers of immigrants from overpopulated neighboring areas. Bugenyuzi Commune has a population of 60,510, of which 47.5% is male and 52.5% female. The average nuclear family household size is 4 persons and the average compound (ruge) is 5.6 persons. There are 37 collines in Bugenyuzi, with colline populations ranging from 730 to 3,670 and an average of 1,638 persons per colline. This area is somewhat flatter than Mutaho and has a lower rainfall.

The crop regime in Karuzi is similar to that of Mutaho, but some crops such as coffee may do less well here because of less rain. Livestock production is more important in Karuzi than in Mutaho, in part because a lower population density means more grazing land is available. Small stock such as sheep and goats are probably more numerous than cattle because residents are traditionally agriculturalists rather than pastoralists.

Because Karuzi contains a mixture of people from other areas and an environment different from the more pronounced hills and valleys characterizing the most densely settled areas of the country, its residents may be more receptive to agricultural innovation than in other more homogeneous regions. It is possible that its residents might diffuse such innovations back to their traditional home areas. Because population density is lower and there is some as yet

uncultivated land in Karuzi, there is room for wider agricutural experimentation without risking minimum food subsistence.

Settlement Pattern and Household Composition

Burundi's population is 95% rural and the traditional settlement pattern is one of homesteads (rugos) dispersed on hillsides. Homes are not clustered in villages, except in the case of recent government settlement programs in previously underpopulated regions. In the traditional pattern, residents of one colline or hill may not be related to each other, but even if not related, social ties are fairly strong among colline residents.

Homesteads may consist of one or more huts surrounded by a bush fence (particularly in areas where livestock production is important) or surrounded by banana trees in areas emphasizing agricultural production. Residents of one compound generally include a father, mother and their unmarried children, or a father, mother, unmarried children, one or more married sons, sons' wives and their children. Married sons can build their own compounds near their father's home if there is sufficient land to be shared or they may go elsewhere in search of land. Whether or not fathers and sons share the same compound or colline after a son's marriage depends on how well they get along with each other, as well as on factors such as land scarcity and family size. Upon marriage, sons may move laterally across a colline (hill) since each individual homestead tends to use vertically defined strips of land extending from hilltop to valley. Hilltops are frequently uncultivated because they are too rocky, bare of trees, or badly eroded and therefore infertile.

A widow inherits her husband's land upon his death and one or more sons may share a piece of land with their widowed mother. They may inherit a portion either before or after the mother's (widow's) death. Again, the degree to which married sons cultivate their own separate pieces of land or share plots with their widowed mothers varies among households according to factors such as relations within the family, family size and land availability.

The project's implementation team will have to devise for survey purposes a definition of household or family production unit which takes into account the empirical variability in the composition of these units.

X104

Land Fragmentation and Acquisition of Cultivation Rights

Area cultivated per family depends largely on the number of adults within the family available to work the land and or the number of dependents or children who must be fed. As noted earlier, most production is directed toward meeting family subsistence needs. Family land holdings are highly fragmented; each household cultivates many different fields and plots; according to a 1968 S.E.D.E.S. survey in Gitega Province, each household cultivates an average of 20 different plots[1] and 9 different fields[2].

Cultivation rights on particular fields may be acquired through inheritance from the father by married or unmarried sons and also sometimes by daughters. (In this case, daughters retain the land even after marriage). Land can also be acquired as a gift from a relative other than one's biological parents. Today communal administration authorities, colline chiefs and councillors are responsible for allocating vacant or unused lands to those who need them. According to present regulations, land left unused for a year goes out of the hands of the "owner" and becomes available to others under the control of commune and colline officials. The degree to which this regulation is actually enforced is unclear.

Land may also be acquired through purchase, with payments sometimes in the form of beer or livestock. Witnesses who assist in boundary definition are required in such transactions. Land may also be rented temporarily, with payment in the form of beer and/or a portion of the harvest. It is also occasionally borrowed, with the owner retaining the right to reclaim it at any time. Only food crops (and not cash crops) are planted on borrowed or rented land.

---

[1] A plot is a portion of a farm comprising a single crop or a particular mixture of two or more crops planted together.

[2] A field is a group of contiguous plots cultivated by one family.

Distribution of Benefits and Burdens

The project will have up to 1,000 primary individual beneficiaries; two major institutional beneficiaries; and two or three thousand secondary or indirect beneficiaries. Because it is set in the Central Plateau region at medium altitude (averaging 1500 meters), project agricultural improvements will be potentially applicable to about 80% of the country and to the majority of its population. The number of actual beneficiaries will depend upon the success of the training and institution building components of the project. As noted earlier, the project is to be based in two communes (Mutaho and Bugenyuzi) in Gitega Province. It will work with Murongwe Research Centre in Mutaho Commune and the Karuzi agricultural school and research station in Bugenyuzi commune.

Primary individual beneficiaries include:

1) the 140-200 farm families who will be direct recipients of improved agricultural technologies developed, distributed and tested under the auspices of the project (70-100 families in each of the two project communes);

2) 600-800 farmers participating in one-or two-day training sessions at the project's two Farmer Training Centres.

Benefits to families living in the two project communes will include acquisition of new knowledge about means of increasing food crop productivity and raising agricultural standards. Since the project focuses specifically on increasing food crop productivity, families will benefit from 1) increased food intake and improved health and nutrition and/or 2) increased income as a result of selling food surpluses.

During the course of the project, 140-200 commune families will receive regular advice from (and provide feedback to) agricultural extension agents and research officers monitoring field trial results on their farms. Approximately 140-200 families (70-100 in each of 2 communes) will be visited regularly (e.g. every week or two) by research and extension officers monitoring project field trials on their farms. Criteria for selecting these 140-200 direct participants are discussed below. The monitoring requirements of these farm field trials will mean a marked increase in the level of technical agricultural advice and assistance available to farmers in the two project communes. This will be directed toward increasing food crop productivity beyond subsistence levels.

Within these 140-200 farm families, women in particular will benefit from the project's activities. It is women who traditionally exercise control over much of the disposition of food crops and who are largely responsible for cultivating them. Any saleable surplus in food crop production is likely to benefit women since it is they who sell small amounts of such crops as beans, maize, bananas, etc. in local markets in order to acquire cash to meet other basic household needs.

Women generally control the disposition of income from sales of small quantities of food crops until they reach home, where the money falls under male control and is less likely to be spent on household necessities. Women can generally assume control of such income only by spending it before reaching home. This is culturally acceptable if they spend the money on necessities such as salt, cooking oil or small quantities of kerosene for lamps.

In short, increased food crop productivity will benefit women and children by improving family food supply and nutrition (through increasing consumption of self-produced food and/or increasing ability to purchase foods not produced on the farm). These benefits should outweigh possible burdens such as increased work for women resulting from higher yields.

The second set of primary individual beneficiaries is the 600-800 farmers who will receive training from project personnel at the two farmer training centres to be constructed in two communes. These farmers will participate in two-day training sessions and field days concerning productivity-increasing changes they can make in their farming practices. They will be drawn largely from Gitega Province and possibly also from ecologically similar areas outside Gitega. Females will be included among training participants since it is they who are largely responsible for food crop production. Training participants will be chosen by the project team with the help of local administrative representatives at the commune, zone, and colline levels.

As is discussed later, these farmer training sessions should increase the project's spread effects. From farmers who travel to the project training centres, new ideas about agricultural practices should spread to their friends and neighbors. This type of short training program has been found to be quite effective elsewhere in Africa as a means of introducing and diffusing agricultural innovations. Through this means and through an upgraded extension service, spread effects may extend project benefits to several thousand farmers.

In addition to these two sets of primary individual beneficiaries, there will also be two major institutional beneficiaries--the national agricultural research institution (ISABU) and the Ministry of Agriculture extension service. These two institutions will receive benefits in the form of training at several levels, as discussed in the project description. Project training activities will improve the quality and direct applicability of agricultural research, as well as improving the quality of the extension service and widening its impact on local farmers. In addition to training extension workers, the project will upgrade the extension service by improving transportation available to extension agents (providing bicycles and motorbikes). As a result of training and logistical assistance, services available to farmers should improve as extension workers will be able to reach more people with more relevant information.

In addition to the three sets of primary beneficiaries named, there will also be possibly several thousand secondary or indirect beneficiaries in the form of farmers not immediately involved in the project who will receive benefits of an improved agricultural extension service and improved agricultural techniques. This is discussed below in the section of spread effects.

Spread Effects and Replicability

The long-term purpose of this project is to develop adaptive research methodologies in two communes so the Ministry of Agriculture can replicate the approach elsewhere. The likelihood of this occurring will be increased by the heavy training component of the project. Even if the entire adaptive research sequence (including setting up multidisciplinary adaptive research teams linking agricultural research, extension, and farmers) is not later replicated by the GRB, the agricultural research results and recommendations developed in the two pilot communes should be directly applicable to many ecologically similar areas in other administrative districts. The project sites were selected with this in mind and are in fact ecologically representative of approximately 80% of the country. The constraints faced by farmers in the project area are similar to those faced by most farmers elsewhere in Burundi's densely populated Central Plateau region. Agricultural recommendations and improved practices developed in this project will be formalized in written and audio-visual form so they can be used elsewhere in the country at low-cost for educational purposes. This means extension of project benefits beyond the original project area need not involve heavy recurrent expenditure on the part of the GRB.

X108

Training and logistical improvements in Burundi's research and extension institutions should produce benefits extending beyond the original project area and implementation period. Improved logistics and personnel quality can later be applied to other agricultural efforts, as well as to an extension of this project's efforts. Those trained in the project will later be able to train other extension agents and agricultural researchers. The project will develop an extension "package" which can be used by Foyers Sociaux and in school curricula, as well as by the agricultural extension service itself. Spread effects can therefore extend to a much wider area covering more farmers in the medium altitude zone, as well as in other zones.

To the extent that the project develops useful agricultural innovations and demonstrates how to transfer these to small farmers, its findings can be extensively diffused beyond the original project area. Whether such spread effects will actually occur depends in part upon the willingness of the GRB to commit some resources to diffusing agricultural improvements developed in this project. It also will depend on the degree to which the project can improve present weaknesses in the extension service such as low morale, lack of interest in rural life, lack of transport, low salaries and lack of funds.

Spread effects will not depend solely on the government but will also depend on diffusion of new information among small farmers along informal channels. The 600 to 800 farmers from various parts of Gitega Province (and possibly some from outside the province) participating in the project's two-day training sessions will represent diffusion points among the rural population for spreading information concerning improved agricultural practices developed in the project. Farmers who travel to the training centres will return to their home areas with new information on ways of increasing agricultural productivity.

If advantages of the project's agricultural innovations are clearly demonstrated and if Burundi government institutional support is adequate, project benefits could be extended to several thousand farmers not directly involved in the project. Spread effects will be easier to achieve if some of the innovations upon which the project focuces involve new techniques or modifications of existing practices which require only the spreading of knowledge and not of seeds or plant material. Spreading material as well as knowledge will require more resources from the GRB.

Selection of Farmer Participants

The traditional nature of Burundi society suggests it would be better to attempt to concentrate on all farmers within a fairly small geographic area within a commune instead of focusing only on a sample of farmers covering a wider geographic area. The Ministry of Agriculture itself favors this approach.. The disadvantage of working with only a portion of the population in a given area in this type of project is that jealousy, suspicion, and possible conflict would be likely to arise between participants and nonparticipants. It might be thought that project participants had been singled out for either reward or punishment. If, on the other hand, every family in a set of "sous collines" within a commune were ostensibly involved in the project, such conflicts might be avoided. It is recognized that some families will be more receptive or willing participants than others, but it is important to at least maintain an appearance of treating everyone equally in order to avoid conflict.

In selecting the 140-200 farmers for field trials and frequent monitoring visits, we recommend using a list of sous collines (each contains 20-25 families) as a sampling frame, sampling a number of sous collines within a commune, and then including all residents of each selected sous colline in the survey to monitor field trials. What should be avoided for the reasons mentioned above is selecting for participation some but not all residents of any given sous colline. Some sous colline residents may be unwilling to participate but all residents of each selected sous colline should be given the opportunity to participate. If the purposes of the project are effectively communicated to area farmers and if field trials do not overburden farmers' very limited labor and land resources, residents will probably participate quite willingly.

The preliminary baseline survey done by SOMEBU before the project team arrives will provide broad data on the two project communes which can be used later by the project team to help select specific areas of project focus (zones, collines, sous-collines) within the two communes.

Before the 140-200 field trials begin, the proposed innovations will have first been tested on a smaller number of farms (possibly 8-10). These preliminary tests on 8-10 farms will be used to assess such factors as the proposed innovation's taste acceptability and compatibility with existing labor and land limitations and with other features of the natural and socioeconomic environment. These 8-10 farmers will be chosen with the assistance of local extension agents who will be able to help identify farmers who can afford to

X110

risk the proposed innovation. These will tend to be somewhat better off farmers who have sufficient land and labor resources so that an experimental failure would not threaten their essential family food supply. They must not, however, be so well off that they do not provide a means of judging the feasibility for the average farmer of the proposed innovation.

Sociocultural Feasibility and Farmer Motivation

Successful introduction of agricultural improvements to reach the beneficiaries described above will require 1) selecting agricultural innovations which are economically and socially compatible with the existing farming system; and 2) disseminating information concerning these innovations in a manner which both makes them credible in the eyes of local farmers and which succeeds in reaching a large number of farmers. In order to acquire an accurate understanding of existing farming systems, their socioeconomic context, and the suitability of specific proposed innovations, the project team and its local counterparts will have to work very closely with small farmers. In many respects the success of the project will depend upon the degree to which project personnel can break through the barriers of farmers' natural suspicion and mistrust of outsiders. This will be essential both in order to acquire accurate information from farmers and to disseminate new information concerning agricultural innovations to farmers.

Once farmers' trust has been acquired, some can be motivated to risk participation in the project's farm level field trials. Because most small farmers in Burundi have very limited land, labor and capital resources and operate very close to bare subsistence levels, these trials must make minimal demands on farmers' resources if they are to be successful. Motivating farmers to change existing practices will require very clearly demonstrating benefits of the proposed innovations. Because present practices and resources confine most small farmers to near subsistence levels of production, carefully chosen techniques producing demonstrated increases in food crop yields are likely to be readily adopted.

Innovations will be particularly attractive to small farmers if they increase output without significantly increasing labor, since most Burundi farmers depend almost entirely on family rather than hired labor supply. Successful agricultural innovations must in addition require little or no cash outlay. The very low incomes of rural families tend to be spent on a narrow range of essential commodities such as soap, salt, palm oil for cooking, kerosene, and occasional foods not grown or not available in the region. It would be unrealistic to expect Burundi small farmers to spend more than a dollar or

s: on any purchased agricultural input. Average annual income for families in the project area is (according to field interviews) $56-$112, most of which must be spent on the items mentioned above.

Motivation by local farmers to adopt innovations proposed in this project will be enhanced if the project focuses on a staple food crop (or crops) such as beans, cassava, sweet potatoes or bananas. The six most widely grown and preferred food crops in Burundi are (in order of total metric tons produced in 1977): bananas, sweet potatoes, cassava, beans, maize, yams and cocoyams. White potatoes, finger millet and peas are also important, but much less so than the six major crops[1]. The likelihood of successful introduction and diffusion of agricultural innovation will greatly decrease if the project does not confine itself to major staple food crops. The project should avoid crops such as wheat[2], soybeans, and peanuts which do not occupy a central position in traditional farming systems.

Since farmers in the project area at present produce little or no food surplus, improved food crop yields in this project should not produce negative consequences such as declining income and declining food crop prices. Such negative consequences might occur only in remote, sparsely populated areas with no capacity to absorb a food surplus within the region and no capacity to export food to a deficit area of the country. These conditions do not prevail in the selected project region. In Gitega Province, high population density and land scarcity indicate there is considerable capacity to absorb increased food production within the province.

It is by no means always true that agricultural innovations focusing on the familiar are more likely to be successful than those focusing on the unfamiliar. In the case of this particular project, however, introduction of entirely new crops or attempts to increase the number of growers of presently minor crops is not recommended. Rural marketing and

---

[1] This information is based on Ministry of Agriculture and Ministry of Planning data in the FY 82 Burundi CDSS.

[2] Wheat is, however, a staple at high altitudes and should be treated as such in the proper ecological zones.

X112

infrastructure in Burundi are still quite rudimentary and could not yet support, (without considerable financial and technical assistance), for example, new food crops requiring marketing and commercial processing before consumption. This project will therefore confine itself to food crops which can be directly consumed by the producer. Any surplus produced should, at least in the short run, be locally saleable and consummable. Burundi's population is growing rapidly and is placing heavy demands on a very limited land base and on insufficient traditional food production systems. Any food crop production increases resulting from this project therefore could be readily absorbed by local producers and existing marketing channels.

The project might, for example, introduce an innovation such as rhizobium inoculation of beans (Burundi's principal staple food crop) to induce nitrogen fixation and thereby increase bean yields. This would make it possible for a family to produce enough food to meet its basic subsistence needs on a smaller area and thereby produce benefits such as the following: (1) make available additional land for a non-food cash crop such as coffee (thereby increasing income); (2) free a portion of the holding for other food crops (thus increasing diet variety and improving nutrition); (3) enable the family to sell a food crop surplus (thereby increasing income); or (4) produce enough of the food crop to meet both subsistence or consumption needs of the current season and planting needs of the next season (thereby avoiding the necessity to purchase seed for planting). In short, a wide range of new production opportunities would be made possible by an improvement such as increased bean yields.

Receptivity to Change in Burundi Agriculture

Externally encouraged agricultural innovation often meets with initial suspicion by traditional producers. Government-encouraged tree planting, for example, has been rejected by some traditional African cultivators because they believe that planting free seedlings provided by the government gives the latter rights to their land. Charging a small fee for seedlings sometimes can eliminate this fear.

This illustrates the kind of suspicion and misinterpretation which can accompany attempts to introduce agricultural innovations. There is much evidence that small producers in Burundi and elsewhere may be unlikely to believe proposed innovations are actually intended to benefit them and not the proposer of the innovation. Successful noncoercive introduction of change therefore requires working very closely with farmers in order to gain their trust and to understand their perceptions of proposed changes.

Recommending increased spacing between bean or maize plants, for example, may be met with resistance by small producers considering wider spacing a waste of land -- even if higher yields result. In such a case, extension efforts would have to address this problem of perceived land wastage directly if the proposed spacing change were to be adopted.

It is first necessary to identify the reasons for any local resistance to proposed innovations and this requires frequent, close contact with local farmers. Farmers must trust the project's extension and research workers or the latter will not be able to acquire accurate data about farmers' actual problems with proposed innovations. For this reason, open and direct communication between project personnel and local farmers will be one of the keys to success of the project. They must be successful in this regard in order to accurately diagnose local needs and constraints in the existing farming system, to design improvements in the system, and to then modify their proposed improvements on the basis of problems identified during field trials and data collection. Farmers must participate directly in the processes of problem identification and solution in this project.

Project personnel will have to make it clear to farmers and the government alike that measurable benefits from this project must follow a year or so of preliminary field trials on a small scale, data collection, and modification of experimental trials on the basis of information acquired from early trials. Only after such prior research will it be possible to more widely disseminate innovations improving food crop productivity. The most significant successful agricultural innovation in the proposed project region in Gitega Province is the introduction and expansion of smallholder coffee production in the last 30-40 years. In its earliest stages, getting farmers to grow coffee in Burundi involved some coercion by local chiefs (e.g., threats of prison sentences or property confiscation). Today the degree of coercion is said to have decreased and coffee seedlings are distributed free of charge to smallholders by local commune and colline administrative authorities. Coffee is now grown in small quantities by possibly 85% of the farmers living in Gitega Province. Though a fairly high proportion of farmers grow some coffee, the area each devotes to coffee rather than food crops remains quite small. Despite favorable producer prices and adequate marketing, coffee production is for nearly all families asecondary priority following production of enough food to meet subsistence needs. Coffee growers' emphasis on food crop production should by no means be discouraged, given the fluctuations and uncertainty of food production, marketing, and

XIIA

prices. The volatile nature of production and marketing of agricultural commodities makes food self-sufficiency a wise strategy for the small producer in Burundi and elsewhere in Africa.

In Burundi, rural marketing mechanisms (particularly cooperatives) are being improved for coffee and certain crops such as cabbages and carrots. Vegetables such as the latter are produced largely for urban markets rather than for rural consumption.

By focusing on improving yields and techniques associated with traditional food crop production, this project addresses a presently neglected area. Success in this area will, as discussed earlier, expand the production options of the small traditional producer. Moreover, unlike a focus on cash crops, it will do so without risking his minimal subsistence production.

Administrative Institutions and Female Participation

The project will (as discussed in the project description) be administered primarily through Burundi's agricultural research institute (ISABU) and through the Ministry of Agriculture extension service. These two institutions will be responsible for carrying out experimental trials at the research station and for arranging and monitoring field trials on local farms. As is discussed in the project description, this effort is intended both to help design agricultural research that is directly applicable to existing farming conditions, and also to promote wider diffusion of agricultural innovations now confined largely to the research station.

The University of Burundi Faculty of Agronomy and Department of Sociology will also be involved and will receive assistance in the form of scholarships for graduate level training in the U.S. as well as grants for special studies within Burundi. Local students in agricultural economics or rural sociology would be very useful in project socioeconomic surveys. They of course do not require translators and their familiarity with the local economy and society would make them very useful in survey design, administration and interpretation.

In addition to the University, ISABU and the Ministry of Agriculture, there are two other principal local institutions which will play an important role in the project.

First, the support of local representatives of the central government should be sought, as they can promote spread

ffects, assist in explaining the project's goals to local armers, and encourage their participation in the project. articularly important in this regard are colline[1] epresentatives; there are local party leaders who may or may t be educated, but who are the only representatives of the ntral administration who actually come from the area they rve. Immediately above them in the administrative hierarchy e zone chiefs, most of whom have at least a primary ucation, and are relatively permanent residents of the areas ey serve.

Unlike colline representatives, zone chiefs may be ransferred to other areas if, for example, they become too nfluential in the area they are serving. Administrators above e zone level generally are less permanent and come from utside the area they serve. Colline representatives, zone iefs and commune administrators could all play an importa le in popularizing the project, encouraging local farmers to rticipate in it, and in maximizing the project's spread ffects beyond the original direct participants. Moreover, the ext support of the central administration helps to officiall gitimate a project in the eyes of local people.

A second local institution which will assist the project is oyers Sociaux. This is a division of the Ministry of Social ffairs and consists of largely rural training centers r dominantly for women) in such fields as agriculture, trition and literacy. There are 99 Foyers Sociaux in rundi; 60 of these are run by the government and 39 are ivately operated by Catholic and Protestant Missions. The e eight principal Foyers Sociaux (one per province), and here are a growing number of secondary Foyers Sociaux at the mmune level. In Gitega province (proposed project site), ere are eight government operated and 10 private Foyers ciaux, including one at Karuzi, the second project site. The oyers Sociaux program includes general courses for all members reading, math, nutrition, health, religion, French, and ild welfare. In addition, individuals select practical urses in agriculture, livestock, masonry, carpentry, cooking,

---

[1] Burundi's administrative divisions are: 2,460 collines, 540 ones, 79 communes, 18 arrondissements, and 8 provinces.

sewing, and knitting. The curriculum at present emphasizes health, nutrition, and child care, rather than food production. The Foyers Sociaux course has not officially recognized academic value but provides a certificate which is a means of distinguishing literates from illiterates. As noted earlier educational material developed in this project will be made available to Foyers Sociaux rural training centers to augment their agricultural curriculum. This should increase the number of indirect beneficiaries of the project.

Most Foyers Sociaux graduates are expected to remain in or help develop their rural settings. There are approximately 100 extension agents connected to Foyers Sociaux. Some Foyers Sociaux extension agents could usefully be incorporated into the project, as they are based in their home areas and are familiar to local residents. Moreover, women would often be more effective than male extension agents in reaching female food producers. Although the Ministry of Agriculture is now attempting to acquire and train some female extension agents[1], there are at present none at the collline level.

In a culture in which traditional sex role and status differences are as important as they are in Burundi, it is important that the project use some female extension workers to communicate with predominantly female food crop producers. Since the Ministry of Agriculture is just beginning to introduce women into the extension service, the project should include women from Foyers Sociaux and possibly also teachers from rural primary schools using the new agriculturally oriented curriculum.

Because women in Burundi are largely responsible for food crop production, they will usually be the family members who are best informed about the associated constraints and problems upon which the project will focus in its data collection and field trials. Although in principle women would seem to be best informed about food crop production, in practice there is much variability among rural households in who is best informed about the farm, who manages it, and who is willing to or permitted to discuss it with outsiders. The age and sex of family members whom project team members interview will

---

[1] The technical agricultural institute (ITAB) is now said to have 40 to 60 female students.

therefore vary from one household to the next. The sex (and possibly also age and education level) of extension workers and enumerators should also be allowed to vary in accordance with the needs and characteristics of different farm households participating in the project. Any such steps which can be taken to reduce the social distance between extension agent and farmer should be pursued in order to improve the effectiveness of communication between the two.

In addition, in order to increase its effectiveness in reaching local farmers, the project will, in addition to ISABU the Ministry of Agriculture, and the University of Burundi, involve both local representatives of the central administration and female extension workers connected to Foyers Sociaux.

ANNEX I

INITIAL ENVIRONMENTAL EXAMINATION

Project Location : Burundi

Project Title : Small Farming Systems Research

Life of Project : FY 1983 - 88

Life of Project Cost : $7,790,000

IEE Prepared by REDSO/ESA : April 1980

Revised by AAO/Burundi: January 1983

Environmental Action Recommended: Negative Determination

AAO/Burundi

February 24, 1983
Date

Assistant Administrator's Decision: Approved _____

Disapproved _____

Date _____

Clearances: RLA

Regional Environmental Officer _____

AFR/TA

SUMMARY PROJECT DESCRIPTION

The Burundi Small Farming Systems Research will be implemented over five and a half years. It will provide $7.8 million in USAID inputs to finance technical assistance, training, commodities and support costs for applied agricultural research with the Burundian Ministry of Agriculture and Livestock The purposes of the project are to help strengthen the institutional linkages between agricultural research, extension and the farming community; to upgrad the professional skills of research and extension staff; and to provide Burundian farmers with relevant innovations in agricultural production technol and methods through farmer training, field trials and demonstrations.

The project will establish a farming systems research and extension departmen in ISABU and will undertake a holistic farming systems research and extension program in two communes in Burundi's densely settled central plateau region. Project activities will involve (a) the planning and supervision of food crop experiments; (b) the application of agricultural research through extension and will stress technological innovations, soil fertility and conservation. varietal testing and crop trials applicable to small farms. These activities will take place at two sites within the same broad ecological region. The sites have roughly the same altitude and cropping patterns, but one has slight higher rainfall and greater population density. The strategy will consist of establishing a research methodology which can be replicated elsewhere in the central plateau and adapted for replication in other communes through joint GRB/USAID efforts under the project. The small farmers of Burundi will be served by a more systematic approach to research and extension, as well as opening up a triangular communication mechanism between the farmers, the research institutions and the extension network.

The strategy pursued to attain the long term objectives will be the generation and transfer of technology which will be suitable for small farm operators to use given the soil, climatic and production inputs available in the target ar Project implementation will stress technologies that fit into what is primari a bimodal rainfed agriculture with cropping systems such as intercropping of (a) maize and beans; (b) sweet potatoes, beans and maize; (c) banana combin (d) cassava, as well as (e) livestock (food and fertilizer); (f) soil conserv and eventually some agroforestry.

The project will need the following U.S. professional staff working as an int disciplinary team:

a) Research agronomist trained in agronomy.
b) Extension specialist with training in agronomy or extension. Experie in farm level testing programs desired.
c) Agricultural economist trained in production economics or farm manage

In addition the project requires an operations/logistics specialist with at l two years experience in sub-Saharan Africa. This person, under the U.S. Team Leader will be responsible for project administrative matters and logistical support.

A total of 44 work months of short term specialists will be provided as needed.

Long term academic degree training (M.Sc.) will involve about seven students, while long term non-degree training in Africa and U.S. (usually 18 months) will involve nine students. Short term training will be done at IITA, CIMMYT, CIAT and other appropriate international agricultural research institutions.

The GRB support to the project will take the form of technical services, new construction and refurbishment of old buildings at Karuzi for GRB staff and office space, facilities and land provided in kind, and salaries for support staff and field workers. These will be provided primarily by the agriculture research institute (ISABU) and the Department of Agronomy Extension Services.

ENVIRONMENTAL IMPACT

The technical assistance and training elements of the project in themselves are technologically neutral. Field activities will include a survey of current farming practices and assessment of the existing farming system; the development and testing of new technologies (both varieties and methods); and crop experiments and field tests on demonstration plots and core farmers' fields. The latter procedure will be repeated throughout the project as new varieties are introduced, tested and modified. The project has a built in component for increasing soil fertility and using practices that conserve soil and water, especially through crop rotations, and the use of animal and green manure. (See technical analysis for discussion of soils problems). Since the project will limit itself to use of the quantities and types of agricultural inputs relatively available to Burundi farmers, the amount of agricultural chemicals used on the project will be low. The project itself will finance only 50 tons of fertilizer and a few miscellaneous other chemicals for use on research station and other demonstration/experimental plots. The use of disease resistant plant varieties will be stressed. All other chemicals used on the project will be EPA approved. Researchers extension personnel and farmers will all be instructed in safe and appropriate usage.

AAO/Burundi is requiring that, prior to release of funds for construction, the GRB provide AID with a current list of pesticides and herbicides being used by the Agriculture Research Institute (ISABU) in its trials both on experimental stations and farmers' fields.

Information will be furnished that includes generic names, manufacturers' environmental data, recommended tolerances and rate and frequency of operation. AID and the GRB will sign a letter to confirm agreement on chemicals that will be used on the experiment stations and farmers' fields under the projects, along with application data and proposed training programs in handling the chemicals.

Construction under the project is at two different sites, Karuzi research station and Murongwe research center. Some buildings already exist in both locations. Both areas receive 1.100 to 1.200 mm of rain a year, although Karuzi gets less than Murongwe and soils at Karuzi are sandier and consequently droughtier and more permeable. Both areas are gently rolling hills, but Murongwe's are slightly steeper.

Project financed buildings at Karuri include:

-- three three bedroom houses
-- one two bedroom house
-- one three room dormitory for instructors.

AID financed buildings at Murongwe include:

-- one four bedroom guest house
-- one training center
-- one dormitory for trainees.

Construction will be simple using standard plans appropriate for the rural environment (See Annex K-3 of Project Paper for further details). No environmentally adverse affects are foreseen in this project. On the contrary project activities, especially the conservation component, should result in a beneficial impact on the environment.

RECOMMENDATION

In the absence of any foreseeable unfavorable factors on environmental effects, we believe no further environmental analysis is necessary and recommend a negative determination.

STATUTORY CHECKLIST AND WAIVERS

Annex J-1	:	Country Checklist
Annex J-2	:	Vehicle Procurement Waiver
Annex J-3	:	Justification for a Waiver of the Requirement of Section 110(a) of the FAA of a Host Country Contribution of at Least 25 Percent of Project Costs.

FAA 5C(1) - COUNTRY CHECKLIST

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

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 481, Secord CR FY 1983 Sec. 143. Has it been determined that the government of the recipient country has failed to take adequate steps to prevent narcotic drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully ?

No. There is no evidence that the GEB has been negligent in this area.

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

(a) No. (b) No.

3. FAA Sec. 620 (e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities ?

No.

4. FAA Sec. 532 (c), 620(a), 620(f), 620D, FY 1983 Appropriation Act Secs. 512 and 513. Is recipient country a Communist country ? Will assistance be provided to Angola, Cambodia, Cuba, Laos, Vietnam, Syria, Libya, Iraq or South Yemen ? Will assistance be provided to Afghanistan or Mozambique without a waiver ?

No.

5. ISDCA of 1981 Secs. 724, 727 and 730. For specific restrictions on assistance to Nicaragua, see Section 724 of the ISDCA of 1981. For specific restrictions on assistance to El Salvador, see Secs. 727 and 730 of the ISDCA of 1981.

Not applicable.

X124

6. FAA Sec. 620(l). Has the country permitted or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property ?

No.

7. FAA Sec. 620(q). If the country has failed to enter into an agreement with OPIC ?

No.

8. FAA Sec. 620(o); Fisherman's Protective Act of 1967, as amended, Sec. 5. (a) Has the country seized, or imposed any penalty or sanction against any U.S. fishing activities in international waters ? (b) If so, has any deduction required by the Fishermen's Protective Act been made ?

N/A. Burundi has not seized or imposed any penalties or sanctions against U.S. fishing vessels.

9. FAA Sec. 620(e); FY 1982 Appropriation Act, Section 727. (a) Has the government of the recipient country been in default for more than six months on interest or principal of any AID loan to the country ?
(b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the appropriation bill appropriates funds ?

(a) No. (b) No.

10. FAA Sec. 620(s). If contemplated assistance is development loans or from Economic Support Funds, has the Administrator taken into account the amount of foreign exchange or other resources which the country has spent on military equipment ? (Reference may be made to "Taking into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB". This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur).

N/A.

11. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States ? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption ?

No.

12. FAA sec. 620(q). What is the payment status of the country's U.N. obligations ? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget ? (Reference may be made to the Taking Into Consideration memorandum).

Up to date.

13. FAA Sec. 620(a); FY 1982 Appropriation Act Sec. 520. Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed an act of international terrorism ? Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed a war crime ?

No.

14. FAA Sec. 666. Does the country object, on the basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA ?

No.

15. FAA Sec. 669,670. Has the country, after August 3, 1977, delivered or received nuclear enrichment or reprocessing equipment materials, or technology, without specified arrangements of safeguards ? Has it detonated a nuclear device after August 3, 1977, although not a "nuclear-weapon State" under the nonproliferation treaty ?

(a) No. (b) No.

16. ISDCA of 1981 Sec. 720. Was the country represented at the Meeting of Ministers of Foreign Affairs and Heads of Delegations at the Non-Aligned Countries to the 36th General Session of the General Assembly of the U.N., of Sept. 25 and 26, 1981, and failed to disassociate itself from the communiqué issued ? If so, has the President taken it into Account ? (Reference may be made to the Taking into Consideration memorandum).

Funds were made available for projects in FY 1982.

B. FUNDING SOURCE - CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 116. Has the Department of State determined that this Government has engaged in a consistent pattern of gross violations of internationally recognized human rights ? If so, can it be demonstrated that contemplated assistance will directly benefit the needy ?

X 126

No. Since the founding in 1976 of the Second Republic, the GRB has proposed a policy of reconciliation and is taking actions to implement it. Within the past fifteen months the GRB has held a referendum on the new constitution and held the first parliamentary elections in 16 years.

2. Economic Support Fund Country Criteria

a. FAA Sec. 502B. Has it been determined that the country engaged in a consistent pattern of gross violations of internationally recognized human rights ? If so, has the country made such significant improvements in its human rights record that the furnishing such assistance is in the national interest ?

N/A.

b. ISCEA of 1981, Sec. 725(b) (Argentina). N/A

c. ISCEA of 1981, Sec. 726(b) (Chile). N/A

FAA SEC. 634(A) - PROJECT CHECKLIST

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

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

A. GENERAL CRITERIA FOR PROJECT

1. FY 1982 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b); Second CR FY 1983, Section 101(b)(1).

a. Describe how authorizing and appropriations Committees of Senate and House have been or will be notified concerning the project;
b. Is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than dollar one million over that amount) ?

c. If the proposed assistance is a new country program or will exceed or cause the total assistance level for the country to exceed assistance amounts provided to such country in FY 1982, has a notification be provided to Congress ?

d. If the proposed assistance is from the $85 million in ESF funds transferred to AID under the Second CR for FY 1983 for "economic development assistance projects", has the notification required by Sec. 101(b)(1) of the Second CR for FY 1873 been made ?

(a) Project listed on p. 239 of FY 1983 Congressional Presentation, Annex I - Africa.

(b) Yes.

(c) Amount is within FY 1982 levels.

(d) N/A.

2. FAA Sec. 611(a)(d). Prior to obligation in excess of $100,000 will there be (a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance ?

(a) Yes. (b) Yes.

3. FAA Sec. 611(e)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance ?

No further legislative action is required.

4. FAA Sec. 611(b); Continuing Resolution Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973

N/A.

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

N/A.

6. FAA Sec. 209. Is project susceptible of execution as part of regional or multilateral project ? If so, why is project not so executed Information and conclusion whether assistance will encourage regional development programs.

The project is not susceptible to execution as regional or multilateral project. It will, however, be able to exchange information on results with other nearby agricultural research institutions to the mutual benefit of all concerned.

7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

N/28

This project only indirectly affects these factors, some more than others, by developing diversification in seed production and encouraging small farm development.

8. FAA Sec. 620 (h). Information and consideration of how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

This project does not directly address these concerns since its orientation is toward LDC small farm development.

9. FAA Sec. 612(b); 636(h); FY 1982 Appropriation Act Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.

Burundi is one of 31 least developed countries in the world. GOB is contributing land, use of some research facilities, salaries of some GOB employees, use of some experimental plots, materials, hand tools, and equipment, as well as some renovation construction. See PP financial analysis for details. There are no U.S. owned local currencies available.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country, and if so, what arrangements have been made for its release?

No.

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

Yes.

12. FY 1982 Appropriation Act Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

No. The project is aimed primarily at food crop production for consumption in country.

13. FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Reg. 16? Does the project or program take into consideration the problem of the destruction of tropical forests?

The project complies with Regulation 16. It also promotes agroforestry in an area which has been deforested.

Best Available Document

14. FAA Sec. 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)?

[illegible] Section 531 [illegible]. Has an emphasis been placed on productive facilities, goods and services which will substantially and directly benefit those living in absolute poverty under the standards [illegible] by the World Bank?

The objective of the Small Farming Systems Research project is to facilitate testing of appropriate improved varieties and agricultural techniques and accelerate their diffusion to families living on small farms (usually less than one and a half hectares). Nearly all the long term beneficiaries from the research fall within the World Bank definition.

FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

The Small Farming Systems Research Project is designed to take research off the station and onto the farm. It stresses labor intensive methods and appropriate technology for small farm production.

The project will indirectly benefit cooperatives in that it will help farmer members to increase food crop production and they will market the food through cooperatives in areas where coops are strong. Tested and improved food crop varieties and production techniques will support self-help food production programs.

Since women produce almost all food crops, it is women who are the major beneficiaries of the project in the long run.

X130

The research information gained from this project will be transmitted to research institutions in nearby countries with similar ecological zones so that they can benefit from it.

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

(1) (103) for agriculture, rural development or nutrition; if so, (a) extent to which activity is specifically designed to increase productivity and income of rural poor; (103A) if for agricultural research, full account shall be taken of the needs of small farmers, and extensive use of field testing to adapt basic research to local conditions shall be made; (b) extent to which assistance is used in coordination with programs carried out under Sec. 104 to help improve nutrition of the people in the developing countries through encouragement of increased production of crops with greater nutritional value, improvement of planning, research, and education with respect to nutrition, particularly with reference to improvement and expanded use of indigenously produced foodstuffs; and the undertaking of pilot or demonstration of programs explicitly addressing the problem of malnutrition of poor and vulnerable people; and (c) extent to which activity increases national food security by improving food policies and management and by strengthening national food reserves, with particular concern for the needs of the poor, through measures encouraging domestic production, building national food reserves, expanding available storage facilities, reducing post harvest food losses, and improving food distribution.

The specific intention and main purpose of this project is for the development and field testing of agricultural research results to meet the specific needs of small farmers. See project purpose and descriptions.

It will also stress plants with better nutrient value. It will also concern itself with on farm storage as well (benefiting from previous research carried out by ISABU and other donors).

c. (107) Is appropriate effort placed on use of appropriate technology ? (relatively smaller, cost-saving, labor using technologies that are generally most appropriate for the small farm, small businesses, and small incomes of the poor).

Yes. The project is aimed at developing appropriate technologies for small farms.

d. FAA Sec. 110(a). Will the recipient country provide at least 25 percent of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least developed" country) ?

GRB will contribute about 17 percent of the total cost of the project. Burundi is a "Relatively Least Developed Country". A waiver of Section 110(a) is attached to the authorization package, and a draft is presented in Annex J-3.

e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than three years ? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed" ?

N/A.

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

Yes. (See beneficiaries and economic analysis sections).

g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.

The project is designed to strengthen the capacity of ISAM and the linkages of research with extension programs. It includes some training of extension personnel and participation of farmers in the development process.

2. Development Assistance Project Criteria (Loans Only) N/A.

3. Project Criteria Solely for Economic Support Fund N/A.

5C(3) - STANDARD ITEM CHECKLIST

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

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

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed ?

Yes.

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

Yes.

3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will commodities be insured in the United States against marine risk with a company or companies authorized to do a marine insurance business in the U.S. ?

N/A.

4. FAA Sec. 604(e); ISDCA of 1980 Sec 705(a). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity ? (Exception where commodity financed could not reasonably be procured in U.S.)

N/A.

5. FAA Sec. 604(g). Will construction or engineering services be procured from firms of countries otherwise eligible under 941 but which have attained competitive capability in international markets in one of these areas.

In practice, the amount of construction is small and although advertised in nearby countries and the U.S. (941 companies will be eligible if registered in Burundi) it is probable that only eligible bidders on construction will be Barundi owned firms.

6. FAA Sec. 603. Is the shipping excluded from compliance with requirements in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates ?

No.

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

The technical assistance will probably be provided by a U.S. university under Title XII.

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

Yes.

9. FY 1982 Appropriation Act (Sec. 504). If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States ?

Yes.

B. Construction

1. FAA Sec. 601(d). If capital (e.g. construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interests ?

Yes.

2. FAA Sec. 611(c). If contracts for construction are to be financed will they be let on a competitive basis to maximum extent practicable

Yes.

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million ?

N/A.

C. Other Restrictions

1. FAA Sec. 122 (b). If development loan, is interest rate at least two percent per annum during grace period and at least three percent per annum thereafter ?

N/A.

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights ?

N/A.

3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries ?

Yes.

4. Will arrangements preclude use of financing:

a. FAA Sec. 104(f); FY 1982 Appropriation Act (Sec. 504). (1) to pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as a method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization ? (3) to pay for any biomedical research which relates, in whole or in part to methods on the performance of abortions or involuntary sterilization as a means of family planning: (4) to lobby for abortion.

Yes.

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

Yes.

c. FAA Sec. 660. To provide training or advice or provide any financial support for police, prisons, or other law enforcement forces, except for narcotics programs ?

Yes.

d. FAA Sec. 662. For CIA Activities ?

Yes.

e. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained.

Yes.

f. FY 1982 Appropriation Act (Sec. 503). To pay pensions, annuities retirement pay, or adjusted service compensation for military personnel ?

Yes.

g. FY 1982 Appropriation Act (Sec. 505). To pay U.N. assessments, arrearages or dues.

Yes.

h. FY 1982 Appropriation Act (Sec. 506). To carry out provisions of FAA Section 209(d) (Transfer of FAA funds to multilateral organizations for lending).

Yes.

i. FY 1982 Appropriation Act (Sec. 510). To finance the export of nuclear equipment fuel, or technology or to train foreign nationals in nuclear fields ?

Yes.

j. FY 1982 Appropriation Act (Sec. 511). For the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights ?

Yes.

k. FY 1982 Appropriation Act (Sec. 515). To be used for publicity or propaganda purposes within U.S. not authorized by Congress ?

Yes.

ACTION MEMORANDUM FOR AA/AFRICA

FROM: AID AFFAIRS OFFICER/BURUNDI

SUBJECT: Vehicle Procurement Waivers (Source/Origin)

PROBLEM: Request for source/origin procurement waiver from Geographic Code 000 (U.S. only) to Geographic Code 935 (Special Free World).

a. Cooperating Country:	Burundi
b. Authorizing Document:	PAF
c. Project:	Small Farming Systems Research Project (695-0106)
d. Nature of Grant:	Grant
e. Description of Commodities:	Four (4) half ton pickups Two (2) Van Ten (10) motorcycles approximately 125 cc
f. Approximate Value:	$100,000
g. Probable Origin:	Japan, France, and Federal Republic of Germany
h. Probable Source:	Burundi.

DISCUSSION: Section 636 (i) of the Foreign Assistance Act of 1961, as amended, prohibits AID from purchasing motor vehicles unless such vehicles are manufactured in the United States. Section 636 (i) does provide, however that "... where special circumstances exist, the President is authorized to waive the provision of this Act in order to carry out the purpose of this act." Handbook 1, Supplement B, chapter 4, paragraph 4C2a(3) states that all vehicles procured under grants must be of U.S. source and origin unless a waiver is obtained. Paragraph 4C2d(1)(b), Handbook 1, Supplement B, provides that a waiver may be granted when necessary to carry out the purpose of the FAA, and if, inter alia, there is a present or projected lack of adequate service facilities and spare parts fo U.S. vehicles. The authority to determine (1) that special circumstances exist for the purpose of Section 636 (i) and (2) that there are adequate justification for a waiver under Handbook 1, Supplement B, has been delegated to you under "Delegation No. 40".

The Government of Burundi has requested AID assistance to address one of Burundi's basic agricultural problems: the relatively low productivity of the small farm. This project will attempt to modify existing research from cash crops to food crops. As new crop production information and new varieties of crops become available, the information and the new varieties will be passed onto the farm through extension agents.

The above vehicles will be used by the technical person and advisors around and between the project areas and Bujumbura to assist and support operations.

Past experience with U.S. manufactured vehicles in Burundi has shown that due to lack of proper maintenance facilities, spare parts, and a representative for U.S. vehicles, U.S. vehicles cannot be adequately maintained. Lack of adequate vehicle maintenance prevents timely project implementation full utilization of technical assistance personnel at the project sites.

N13

The type of motorcycles to be procured is a single cylinder (100-125 cc.) model. At present there is no light weight motorcycle manufactured in the United States.

RECOMMENDATION: For reasons stated above, it is recommended that (1) you conclude that special circumstances exist which justify the waiver of the requirement of procurement of U.S.-manufactured vehicles under FAA, Section 636(i), and (2) you certify that exclusion of procurement from Free World countries other than the cooperative country and countries included in Code 941 would seriously impede attainment of the U.S. foreign policy objectives and objectives of the foreign assistance program.

Approved _____

Disapproved _____

Date _____

JUSTIFICATION FOR A WAIVER OF THE REQUIREMENT OF SECTION 110(a) OF THE FAA OF A HOST COUNTRY CONTRIBUTION OF AT LEAST 25 PERCENT OF PROJECT COSTS

(a) Cooperating Country:	Burundi
(b) Project:	Small Farming Systems Research (695-0106)
(c) Nature of Funding:	Grant

Discussion: Section 110(a) of the Foreign Assistance Act of 1961, as amended ("FAA") provides that, "No assistance shall be furnished by the United States Government to a country under section 103 through 106 of this Act until the country provides assurances to the President, and the President is satisfied that such country will provide at least 25 percent of the costs of the entire program, project or activity with respect to which such assistance is to be furnished, except that such costs borne by such country may be provided on an 'in kind' basis."

Section 124(d) of the FAA (and Sections 112(b)(1) of the International Development and Food Assistance Act of 1978) amends Section 110(a) of the Foreign Assistance Act of 1961 by adding the following waiver provision:

> "and except that the President may waive this cost-sharing requirement in the case of project or activity in a country which the agency primarily responsible for administering Part I of this Act determines is relatively least developed based on the United Nations Conference on Trade and Development list of 'relatively least developed countries'."

Burundi is on the UNCTAD list of relatively least developed countries. AID regulations implementing FAA Sections 110(a) and 124(d) are set forth in AID Handbook 3, Chapter 2, Appendix 2G and Section E2 which state that it is reasonable to conclude that granting of a waiver is permissible whenever the initiation and execution of an otherwise desirable project is handicapped primarily by the 25 percent contribution requirement. Appendix 2G sets forth general considerations should be taken into account in determining when a waiver of FAA Section 110(a) would be appropriate. These considerations relate to financial constraints, country commitment, nature of the project, phased contribution and other factors. These considerations, as they relate to Burundi, are set forth hereafter.

Nature of the Project

The dual purposes of the Small Farming Systems Project (SFSR) are:

(1) To strengthen the GRB institutional linkages between agricultural research and extension organizations and the farming community, and to upgrade the professional skills of the Ministry of Agriculture and Livestock's research and extension staff.

(2) To provide the farmers of Burundi with relevant innovations in agricultural production technology and methods through farmer training field trials and demonstrations.

The SFSR project addresses one of the most basic of Burundi's agricultural problems: the relatively low productivity of the small farmer. The project uses a farming systems approach to applied agriculture research. The project will reinforce the shift towards food crops in existing research programs. In addition, it seeks to improve the effectiveness of food crop research and extension and eliciting the participation of farmers in the research process. This approach should lead to a greater emphasis on developing and testing new crop varieties and production methods under conditions more closely reflecting those of the average small farmer. The project should thus promote acceptance of relevant research results by farmers and lead to more rapid increases in agricultural production.

The project has several valuable components which make it a desirable project for AID financing even though the host country contribution is limited to 17 percent. These are:

-- Better trained agriculture technicians in research and extension.

-- Establishment of a mechanism to provide two way communication between farmers and research/extension workers. This includes setting up a Farming Systems Research and Extension Department at the Agriculture Research Institute (ISABU) and Adaptive Research Teams.

-- Methodology established for collecting farm level agricultural information and farming systems data.

-- Improved capacity of ISABU to conduct research directly applicable to small farms.

-- Strengthened outreach capability of the extension service in the project communes with methodology established for replication elsewhere.

-- Greater acceptability by small farmers of ISABU research results.

-- Improved capacity to produce high quality seed for distribution to farmers.

Country Commitment: The GRB is fully committed to this project and very anxious for it to begin as promptly as possible. The degree of commitment can be determined by the fact that GRB has agreed to finance rehabilitation of some existing but tumbledown housing to accelerate project implementation. Ministry of Agriculture and Livestock staff have been involved in the project design since the beginning.

Financial Constraints: Although Burundi's growth rates have been considerably better than most African countries since 1976, the country is facing serious budgetary and foreign exchange difficulties. These are caused by a combination of world market prices and the structure of Burundi's economy. In normal years, more than 95 percent of Burundi's commodity exports take the form of coffee. Coffee also contributed very substantially to the Ordinary (operating) and Extraordinary (development) Budgets. When the world coffee price plunged, Burundi's ordinary budget coffee receipts dropped from nearly $13.8 million in 1980 to less than $274,000 in 1981, although Burundi's coffee harvest was 60 percent higher in 1981 than the previous record crop. The loss in receipts for the ordinary budget was larger than 1981's operating expenditures for health, agriculture and transport combined. The GRB has probably lost money on coffee for two out of the last three years.

It should also be noted that the Small Farming Systems Research project is heavily intensive in its use of expensive expatriate staff. Nearly 54 percent of the project in constant prices will be spent on short term, long term and campus support items for technical assistance staff. It should be noted that annual salaries, allowances and support costs of a senior Burundi scientist are probably about 10 percent the annual cost of an advisor under the Title XII program. The high cost of technical assistance makes it very difficult for the GRB to reach the 25 percent contribution level.

Twenty five percent of the project costs is $2,334,000. The GRB is contributing $1,546,000, including inflation and contingencies, or about 17 percent of the project costs. GRB contributions include salaries and benefits for staff trainees and laborers, rehabilitation of existing housing, land, and research station utilities as well as allowances for contingencies and inflation.

Recommendation: That you approve a waiver of the FAA Section 110(a) requirement that Burundi contribute 25 percent or more of the Project for the Small Farming Systems Research Project (695-0106).

Approved _____

Disapproved _____

Date _____

x141

ANNEX K

PROJECT IMPLEMENTATION
AND
BUDGET

TRAINING PLAN

In general, more highly trained technicians will return to ISABU as researchers. Six of the trainees will eventually take up positions within the MOA and five will be assigned to the ARTs. Prior to departure most of the agricultural professionals will work with the ARTs for at least one year. Hopefully this will better orient them to the kinds of problems for which they should be trained and, as a result, increase the effectiveness of the training. Most of those trainees who do not work with the ART's prior to departure, generally those without agricultural backgrounds, will do so upon their return - even those taking up positions with the MOA. This large pool of trainees assumes adequate counterpart staffing at all times, and creates a substantial pool of trained Burundians from which to launch a second phase of the project should results of the first phase merit one.

The table on the next page indicates the phasing and posting of long term trainees under the project. During year two, the first year of ART field research activities the T.A. team will have one counterpart each in agronomy, agricultural economics and agricultural extension. From year three onward there will be two counterparts for each discipline other than extension. This will allow expansion of ART activities into the second commune in such a way that only one of each pair of technicians will be new. The other will have worked with the ART for a year and should, by that time be able to carry out the work with a minimum of supervision. The extension specialist will work with both ART's simultaneously.

This approach to training means the expatriates will have one set of completely green counterparts each year. While that may not be ideal from the point of view of the short-term effectiveness of the individual ARTs, it will create a much longer pool of technicians with ART experience and will facilitate a much more rapid diffusion of the farming system research approach to other ISABU research centers.

The operations/logistics specialist will be responsible for programming long-term training and selecting training sites in collaboration with the project team leader, the Director of Agricultural Planning and the Campus coordinator. The project team leader and the Director of Agricultural Planning will jointly approve candidates selected for training in foreign countries.

PHASING OF PROFESSIONAL STAFFING AND ACADEMIC TRAINING PROGRAM FOR SMALL FARMING SYSTEMS RESEARCH PROJECT

Project Training	Previous Training	Training/staffing Status 1	2	3	4	5	Final Destination
M.Sc. Training							
Soil Fertility	L.Sci.	Trg.	Trg.	ISABU	ISABU	ISABU	ISABU
Edible Legume Prod.	L.Sci	Trg.	Trg.	Trg.	ART	ART	ART
Soil Microbiology	I.Agr.		Trg.	Trg.	Trg.	ISABU	ISABU
Soil Microbiology	L.Sci.			Trg.	Trg.	Trg.	ISABU
Agricultural Econ:	I.Agr.	Trg.	Trg.	ART	ART	ART	ART
Agricultural Econ.	L.Econ.		Trg.	Trg.	Trg.	MOA	MOA
Extension/Comm.	L.Econ.		Trg.	Trg.	ART	MOA	MOA
Non-Degree Training							
Maize Production	I.Agr.		ART	ART	Trg.	ART	ART
Soil Fertility	ITAB			ART	ART	Trg.	MOA
Roots and Tuber Production	I.Agr.				ART	Trg.	ISABU
Forage Legumes Production	ITAB			ART	Trg.	MOA	MOA
Agricultural Econ.	ITAB	Trg.	ART	ART	ART	ART	ART
Extension/Commun.	L.Econ.	Trg.	Trg.	ART	MOA	MOA	MOA
Extension/Comm.	ITAB	Trg.	ART	ART	ART	ART	ART
Small Farm Animal Production	ITAB		Trg.	MOA	MOA	MOA	MOA
Small Farm Animal Production	I.Agr.			Trg.	ISABU	ISABU	ISABU
Number assigned to Project		6	11	14	14	12	11
Number leaving for Training		6	4	2	2	2	0

POSITION DESCRIPTIONS

Recruiting Notes

A training session of one week's duration in the farming systems approach, presented in Nairobi by CIMMYT, will be required of all U.S team members.

French language skills of S-3, R-3 will be required. If otherwise good candidates fall slightly short of this level, language training in French can be arranged, either full-time in Washington or part time upon arrival in Burundi.

The nature of the work of three specialists will require that they spend a very high percentage of their time at the project site, working very closely with Burundi counterparts and farmers in rural areas. They will be housed at Karuzi.

1. Research Agronomist

A. Qualifications

1) M.S. or Ph.D. in agronomy

2) Minimum of 3 years living or working experience in sub-Saharan Africa.

3) Minimum of 5 years research experience in cereal and legume production in a tropical or sub-tropical region (preferably sub-Saharan Africa). Fieldexperience should include research in cropping systems and seed production, as well as working with and training inexperienced agronomists from developing countries.

4) Demonstrated ability in varietal testing and maintenance of seed stocks, designing and implementing crop rotation research for improved soil management and production technology.

5) Ability to advise and assist multidisciplinary research/ extension team composed of host government and project technicians who will be responsible for planning, implementing, and evaluating on-farm demonstrations/research.

6) French language skills in speaking and reading at S-3, R-3 level.

B. Duties and Responsibilities

1) Assist ISABU plant breeders in determining the best varieties of farm crops, especially cereals and legumes, for the ecological environment of the rpoject. Following annual research plan of Ministry of Agriculture, help the Karuzi Station director to plan and supervise on-station crop research appropriate to cropping systems needs of small-holders.

2) Assist ISABU technicians in developing a seed multiplication program to maintain genetic purity and high quality seed stocks in sufficient quantities of adaptable varieties for the research/demonstration farm and project farmers.

145

3) Evaluate available experimental data. Using data and information obtained by the economic surveys, In collaboration with the Karuzi Station director devise appropriate farming systems research to be tested at the training center research/demonstration farm and in farmers' fields.

4) Study the effects of cereal/legume rotations and intercropping, and with ISABU agronomists, the extension/agronomist and agricultural economist develop and test appropriate cropping systems to improve agricultural production in the project area.

5) In cooperation with other project technicians, assist with identification of other agronomic research needs of small farms, and devise appropriate experiments.

6) Arrange or carry out the needed research.

2. Extension Specialist

A. Qualification

1) MS or Ph.D. in agronomy or extension, with supporting training in the other field.

2) Minimum of 3 years living or working experience in sub-Saharan Africa.

3) Minimum of 5 years of extension experience in cereal and legume production in a tropical or sub-tropical region (preferably sub-Saharan Africa). Field experience should include significant responsibility in managing farm level testing programs working directly with farmers, and training inexperienced agronomists or extension agents, especially those from developing countries.

4) Demonstrated ability to work on a multi-disciplinary research/extension team composed of host government and project professionals who are responsible for planning, implementing and evaluating a farming systems research activity.

5) French language skills in speaking and reading at S-3, R-3 level.

6) Willingness to live and work in rural areas.

B. Duties and Responsibilities

1) Assist with the planning and implementation of a socio-economic and agronomic survey of the designated project area.

2) Assist project personnel in collecting of agronomic and economic data on cropping practices and cropping systems followed by project farmers during the production cycle. Analyze and evaluate these data and availeble experimental data.

3) Participate in team decision making regarding content and design of research, testing and extension programs.

4) Play a leadership role in the development of training materials for in-service training courses for counterparts and other Ministry of Agriculture extension and research officers.

3. Agricultural Economist

A. Qualifications

1) M.S. or Ph.D. training in agricultural economics (with speciality in farm management). Additional training and/or experience in rural sociology (specifically, in the culture and social organisation of African societies) is highly desirable.

2) Minimum of 3 years of experiences living and working in sub-Saharan Africa.

3) Experience in survey design and administration and in analysis and interpretation of data.

4) Demonstrated ability to work productively as a member of a multi-disciplinary research/extension team, composed of both expatriate and indigenous professionals. Key elements include ability to interact across disciplines and across national/ethnic lines.

5) French language skills in speaking and reading at S-3, R-3 level. Working knowledge of Swahili and/or Kirundi would be useful.

6) Willingness to live and work in rural areas.

B. Duties and Responsibilities

Although fundamentally an agricultural economist, the incumbent of this position must also possess broad social science interests and competence. He/she will be required to design, administer, and analyze household level verification surveys in rural Burundi. He will be expected to draw upon this data base, possibly using electronic data processing facilities, to provide guidance for frequent in-project decisions about research needs and extension programs. The economist will be responsible for the following :

1) In collaboration with his counterpart design, implement and analyze baseline and formal verification surveys for quantifying baseline data against which the import of the work of the FSRE Department can be evaluated.

2) Together with his counterpart conduct multiple-visit surveys of farm families in the project area in which, over time, confidence and trust are established permitting access to information not easily divulged to strangers.

Based on this information and on direct observation, identify key constraints in the farming system.

3) Identify changes or innovations which give promise of improving the farming systems.

4) Develop and carry out, jointly with the Research Agronomist and other project personnel, ways of developing, adapting and/or testing these innovations, to determine their impact and their acceptability.

X/A7

Participate in selection of one or more of these innovations that will be the basis of field trials on 70-100 farms in the project area.

5) Work with the research agronomist and other expatriate and local team members selecting innovations, and in designing and monitoring field trials of those innovations on local farms. During this period, the economist will collect additional social and economic data which will be used in the evaluation of the innovations practiced in the field trials.

6) Participate, along with the Extension Specialist and local project personnel in the popularizing of selected innovations, and follow up with studies of the acceptability and impact of the innovations on the household.

7) Train one or more Burundi counterparts in farming systems research, and participate in the in-service training of extension workers assigned to the project.

8) Jointly with the rest of the TA team, identify needs for short-term consultants, select trainees and develop their training programs and perform other functions to further the attainment of project goals.

4. Operations/Logistics Specialist

A. Qualifications

1) B.S. or M.A. in business administration or related degree (may be waived on basis of previous work experience).

2) Minimum of 2 years living or working experience in sub-Saharan Africa.

3) Minimum of 2 years experience in a postion involving administration, operations and logistics, preferably in sub-Saharan Africa.

4) Basic skills and some experience in maintaining project records and financial accounts.

5) Ability to devise resourceful, innovative solutions to various supply, logistical and maintenance problems typcial of landlocked developing countries.

6) French language skills in speaking and reading at the S-2,R-2 level or better. In addition, a working knowledge of Swahili or Kirundi would be useful.

B. Duties and Responsibilities

1) Under the supervision of the U.S. team leader, will be responsible for administrative matters and logistical support of the project.

2) At earliest stages of project, monitor contracting and construction of project facilities at Murongwe and Karuzi.

3) Work with AAO and GRB in arranging TA housing to be constructed at project site or acquiring rented housing and office space in Bujumbura for U.S. team.

4) With help from appropriate AID officials in AAO and REDSO/EA, prepare various project implementation orders (PIOs) for technicians, commodities and participants.

5) Work with GRB MinAg and campus of U.S. university on selection and processing of Barundi participants for U.S. training.

6) Maintain project records and financial reports in accordance with requirements of AID, GRB and U.S. university contractor.

7) Serve as control officer for short-term project consultants.

8) Other administrative duties as assigned by team-leader.

CONSTRUCTION AND PROCUREMENT PROCEDURES

A. CONSTRUCTION PROCEDURES

1. Description and Purpose of Facilities

The construction element of the project is limited to facilities that provide direct support to the technical assistance and in-country training components. These include the following facilities at the Murongwe Center and the Karuzi Station.

Type and number of facilities	Area (m^2)	Site Location
One 4 bedroom guest house	160	Murongwe
Three 3 bedroom houses	145 (one house)	Karuzi
One 2 bedroom guest house (conditional)	130	Karuzi
One training center	162.5	Murongwe
One dormitory for trainees (25)	160	Murongwe
One 3 room dormitory for instructors	60	Karuzi.

The three U.S. technicians should spend about 75 percent of their time at the two project sites at Murongwe and Karuzi. The training center will provide the focal point of the in-service training program for groups of trainees from the surrounding commune.

A small three room dormitory will provide lodging facilities at the Karuzi site for the short-term visiting local teachers.

2. Engineering Planning/Construction Standards

a) Four bedroom guest house

We propose using a modified version of the GRB's standard three bedroom drawing (Type A), including an additional bedroom and a bathroom. The plans for these houses have been developed by the building division of the Ministry of New Works(MOW) for the U.S. technicians under AID Basic Food Crops project (project no. 695-0101). REDSO engineers have approved the plans and specifications. the MOW will carry out the proposed modifications.

b) Training Center

The center will be a simple, single story structure(6.5 x 25 m). It will have a classroom to accommodate about 30 students, which will double as a dining hall or kitchen facility, along with two offices, a storeroom and three toilets.

c) Dormitory for Instructors

The GRB's standard four-room dormitory plan (Type C) developed by the Ministry of New Works for AID Basic Food Crops project will be modified (size reduced from four to three room dormitory) to suit the requirement of this project for a small dormitory for instructors.

d) Dormitory for Trainees (25 local)

The GRB will modify plans for the dormitory for use by the local trainees. Cost estimates are based on the figure of 160 square meters at $\$600/m^2$.

e) Three bedroom for Technical Assistance Personnel houses(3Nos)

The project will use GRB's standard three bedroom type housing design previously used for TA housing under AID Basic Food Crops project (695-0101). Complete IFB documents for this housing have been reviewed and approved by the REDSO/Engineer for previous projects.

f) One two bedroom guest house for Karuzi

This house is included on a provisional basis. Our preferred option is to rehabilitate an existing house at the Karuzi station but this may not be possible. The project will use the standard two bedroom type housing design built for the AID Basic Food Crops Project.

3. Structure Standards

All structures are single story buildings, to be built as frame structures with hollow steel section as columns and beams and burnt bricks as in-fill for walls. The concrete floors of the dormitory and guest house are to be finished with PVC tiles. The floors of the dormitories will be finished with cement screed. The roofing will be self-supporting locally manufactured "eternit". Locally manufactured hollow steel sections will be used for window and door frames. Cement, metal fixtures (locks, hinges, handles, etc.), plumbing fixtures and pipes, electrical fixtures and accessories will be imported. However these items are normally procured by the building contractors as "shelf items". Consequently the project team considers that importation of building materials specifically for this project will not be required.

4. Construction cost estimates

Type of Building	Area of each building	Total area	Cost per Sq.meter	Total Cost in US$
a) Guest house(1)	160	160	$700	$112,000
Guest house(1)	130	130	$700	$ 91,000
b) Training center (1)	162	162	$600	$ 97,200
c) Dormitories (1)	60	60	$600	$ 36,000
Dormitories (1)	160	160	$600	$ 96,000
d) TA Housing (3)	145	435	$700	$304,500
			Total	$736,700

Access, water and electricity lines are included in the cost elements.

X151

5. FAA Section 611 (a) Requirements

On the basis of the above information, it is the view of the REDSO engineer that adequate planning for the construction element of this project has been done, and that cost estimate, based on similar recent experience, are reasonably firm. Therefore, the provision of FAA Section 611 (a) as amended are deemed to have been satisfied.

6. Construction Execution

Although the actual sites for the proposed construction have not yet been determined, a number of suitable plots are available at both the sites for the proposed construction. A REDSO/EA engineer has visited the field sites and believes from a visual inspection that the sites are suitable for the planned facilities.

Access to all sites is easily available. Adequate domestic water supply is available at both the sites and electricity is provided through diesel generator sets at Murongwe (Karuzi has hydro power) which have adequate capacity to meet the additional load generated by the proposed facilities. The GRB will be responsible for development of the site plans and complete bid documents, either by the General Directorate of New Works or through a contract with an A and E firm. The GRB standard bid documents for building construction have been modified by AID engineers and are now in use for the construction activities under the AID Basic Food Crops project. The same documents will be used for this construction activity which will be carried out by local private contractors. The construction will be monitored by the engineers of the Ministry of Public Works, General Directorate of New Works. The payment to the contractors will be made by AID on monthly instalments on the basis of the work progress certificates prepared by the engineer of the Ministry of New Works. Prepositioned checks for the payments may be held by the AID project manager for ease and promptness. As an alternative the Fixed Amount Reimbursement (FAR) method for Construction payment may be considered during implementation. In this case an advance of 10 percent of estimated cost may be needed to start the construction. The FAR method has been discussed with appropriate host goverument officials and reactions were favorable. The proposed construction time table after the project approval is as follows :

1.	Prequalification and analysis of responses (parallel to IFB preparation). preparation of complete IFB documents	3months
2.	AID approval, given out	1 month
3.	Contractor bid period, bid analysis, contract award,AID	3 months
4.	Construction period	12 months
	Total	19 months

7. Electricity Supply

The Karuzi station will be able to benefit from a nearby microhydro electric installation. It should be possible to have the electricity on site by the end of 1983. A microhydro NRECA engineer, then visiting Burundi as a member of a survey team, visited the small Buhiga microhydro scheme

at Buhiga, eight kilometers north of Karuzi on the main road to Gitega. An Episcopalian mission is constructing the plant. The Mission had originally planned a small, 60 kW hydroelectric plant on a site on the upper reaches of the Ndurumu River about 1-2 km from the Mission center to cater to its needs. However, permission to build that plant was granted by the government only on the conditions (1) that its capacity be increased to make optimum use of the streamflow, and therefore potential power, available and (2) that power be transmitted down the road to the center at Karuzi. Accordingly, the plant's design capacity was increased to 220kW based on initial streamflow estimates. At present, the civil works (masonry dam and power canal) are approximately half complete and the steel penstock pipe is on location. The turbogenerating equipment from Ossberger is ready for shipment inland from the coast. Eucalyptus poles for the transmission line are presently being prepared and, simultaneously, being installed. The survey for the transmission line to Karuzi has been completed.

After beginning dam construction, the flow was found to be about twice ~~that originally estimated for most of the year.~~ The government subsequently required that provision be made for the eventual installation of a second turbine in the powerhouse to double the plant's capacity.

Geoff Bishop, an Australian mining engineer who has been with the Mission for eight years, has had overall responsibility for design and construction. Philip Aston, an English electrician, has had primary responsibility for transmission and distribution of the power generated by the installation. The entire project is being constructed and financed by the Mission, at an estimated cost of about FBu 7 million ($77,000). It seems as if an additional FBu 2 million ($22,000) must be found to complete project financing.

The electricity load at Buhiga will be the trade school, <u>école normale</u>, hospital and market area. Initially, the load will be primarily for lighting, with a peak of only 10 kW, but with the possibility of switching from wood to electricity for cooking (60 kW). Even with the possible heavy demand required for cooking, there will be a large excess of power for the foreseeable future even with one unit in operation.

The GRB, desires to build a transmission line to the new Karuzi provincial headquarters. Government buildings, ITAB and the agriculture research station will all benefit from this, and there clearly is enough power when both units are in place. Electricity should be available in Karuzi by the end of 1983.

A question remains concerning maintenance after Mr. Bishop leaves. It should be noted that maintenence is a nationwide problem, and various proposals to deal with this question are set forth in the NRECA microhydro report.

B. PROCUREMENT ARRANGEMENTS

Commodity procurement under the project totals $298,000 and falls into several categories (details of items and their cost are in the Financial Annex (Annex F)). the following procurement sources will be used :

1) <u>Office Equipment and Technician Houses/guest house/ training center furniture</u>

Sufficient time will exist to permit solicitation for the U.S.

X152

procurement by advertising in the Commerce and Business Daily through the AID Small Business Office. Prices received plus transport to Burundi should be compared with the purchase of equivalent items in Kenya plus transportation to Burundi (automatically a Code 941 source for Burundi which is on the list of least developed countries). The more advantageous bid should then be accepted.

2) Field Laboratory Equipment and Seed Equipment

These are mainly relatively low cost, small size technical instruments (except for 2 plot threshers) which will be procured in the U.S. through a purchasing agent selected by the GRB and approved by the AAO and REDSO.

3) Vehicles

Cars, motorcycles and bicycles will be procured locally through authorized agents. A waiver to permit Code 935 purchase of vehicles (4 pick-ups, 2 carry-all vans, and 10 motorcycles) is included as Annex L. Fifty bicycles of Code 941 origin (probably India) will be procured locally or in Kenya or Zimbabwe.

4) Building Materials

Construction commodities and materials, estimated at 50 percent of total construction costs, will be procured locally by the building contractor. Cement and most other materials will come from Code 941 countries (Zambia, Zimbabwe and Kenya). The newly revised shelf item rule will be used for local purchase of fixtures and hardware items of Code 935 origin.

SUPPLEMENTARY FINANCIAL TABLES

TABLE K-4-1 SUMMARY OF AID PROJECT INPUTS

Technical Assistance		3,038,000
Training		935,000
Construction		774,000
Commodities		298,000
Operating Costs		611,000
	Total Base Price	5,656,000
	Contingency (10%)	566,000
	Sub Total	6,222,000
	Inflation (12%) compounded annually	1,568,000
	Grand Total AID Budget	7,790,000

TABLE K-4-2: BREAKDOWN OF TECHNICAL ASSISTANCE COSTS

The estimate of the average cost of one person year of long-term technical assistance assumes an average assignment of two years and an average family size of two adults and two children with the total children being equally divided between primary and secondary school ages.

Average Annual Cost FY 83 (Long-Term Staff)

Salary	$40,000
Transportation of personnel, 1/2 RT/year ($1,500 x 3.5)	5,200
HHE Transportation (surface and air)	7,000
Automobile transportation (3,000 lbs)	1,200
U.S. Storage	600
Post Differential (25%)	10,000
Post cost-of-living allowance	4,200
Education travel and education allowance	10,000
Utilities	3,000
In country travel	4,600
Temporary Lodging	1,000
Retirement, FICA (178)	6,800
R & R	3,500
Emergency medical evacuation/visitation	1,000
DBA (3.5%)	1,400
Health, Dental and Life Insurance	2,100
S./Total	101,600
Overhead 28%	28,400
Total	130,000

Average Monthly Cost FY 83 for Short-term University Consultants

Salary (45,000 ÷ 12)	3,750
Overseas Differential (10%)	375
Per Diem (120 x 15 days plus 60 x 15 days)	2,700
International travel	3,000
In country travel	200
Fringes	900
DBA (3.5% of salary)	150
Miscellaneous	250
S/Total	11,325
Overhead 28%	3,175
Total	14,500

TABLE K-4-3: TECHNICAL ASSISTANCE

($000)

TECHNICAL ASSISTANCE ($000)	Person Months	PROJECT YEAR 1	2	3	4	5	TOTAL
Long-Term							
Operations/Logistics Specialist	(60)	110	110	110	110	110	550
Research Economist	(48)	-	130	130	130	130	520
Ag. Economist	(48)	-	130	130	130	130	520
Extension Specialist	(48)	-	130	130	130	130	520
Sub Total	(204)	110	500	500	500	500	2,110
Short-Term							
Soci-Economic Analyst	(8)	-	29	29	29	29	116
Ag.Training Specialist	(4)	-	15	15	15	15	60
Seed Production Spec.	(4)	-	15	15	15	15	60
Soil Scientist	(4)	-	15	15	15	15	60
Soil Conservationist	(4)	-	15	15	15	15	60
Microbiologist	(4)	-	15	15	15	15	60
Computer Systems/ Programmer	(4)	-	15	15	15	15	60
Other Specialists	(5)	15	15	15	15	15	75
Evaluation	(7)	-	15	29	-	58	102
Sub Total	(44)	15	149	163	134	192	653
On-Campus Contract Support							
Campus coordinator	(30)	15	15	15	15	15	75
Administrative Assis.	(15)	6	6	6	6	6	30
Secretary	(60)	15	15	15	15	15	75
Fringes (20%)		7	7	7	7	7	35
Overheads (28%)		12	12	12	12	12	60
Sub Total	(105)	55	55	55	55	55	275
Total Technical Assistance		180	704	718	689	747	3,038

TABLE K-4-5: DETAILED LIST OF COMMODITIES

US$

	PROJECT YEAR					
	1	2	3	4	5	TOTALS
Vehicles						
ton pick-ups	39,000				13,000	52,000
2 carry-all vans		16,000	16,000			32,000
10 motorcycles		8,000	8,000			16,000
50 bicycles		5,000	5,000			10,000
Sub Total	39,000	29,000	29,000		13,000	110,000
ART Field Equipment						
2 Altimeters (metric)		300	300			600
20 Max-Min Thermometers(c°)		200	200			400
20 Rain Gauges (metric)		100	100			200
10 Spring balances(metric)		250	250			500
10 measuring tapes (metric)		250	250			500
2 measuring wheels(metric)		200	200			400
1 survey instrument (level)	1,500					1,500
10 Prism Compasses		700				700
10 Clinometers		700				700
10 Survey rods (sets)		1,000				1,000
2 Planimeters		500				500
5 Programmable Calculators		1,500				1,500
4 Soil Sampling tubes		200	200			400
3 dozen soil cans		250	250			500
2 Plant tissue kits		150	150			300
2 Soil testing kits		250	250			500
3 Set radio network	10,000					10,000
10 hand level		250	250			500
50 clipboards		100	100			200
2 cameras		1,000				1,000
2 slide projectors		500	500			1,000
2 overhead viewers		800	800			1,600
2 desk calculators		500				500
2 electric generators		1,500	1,500			3,000
Miscellaneous		1,000	1,000			2,000
Sub Total	11,500	12,200	6,300			30,000
Seed Equipment						
2 Plot threshers		30,000				30,000
2 Seed cleaners		2,000				2,000
2 Germination cabinets		2,000				2,000
4 Analysis desks		1,000				1,000
4 Magnifying glasses		500				500
2 Binocular Microscopes		2,000				2,000
24 Forceps		100				100
2 Desk Balances(metric)		500				500
2 Platform scales(metric)		1,000				1,000
4 Seed sampler, 6" tier		200				200
4 Seed sampler, 30" tube		300				300

TABLE K-4-5: DETAILED LIST OF COMMODITIES Continued

US$

	PROJECT YEAR 1	2	3	4	5	TOTALS
Seed Equipment cont.						
500 storage bottles		500				500
1000 Cloth sample bags		200				200
12 Triangular pans		100				100
12 Rectangl. pans		100				100
2 Hand screens		500				500
Sub Total		41,000				41,000
Office Equipment						
1 Mini-computer		12,000				12,000
2 Electric typewriters	2,000		2,000			4,000
2 Manual typewriters	1,000		1,000			2,000
1 Mimeograph	1,800					1,800
1 Photocopy machine	2,000					2,000
1 Adding machine/ calculator	500					500
7 Desks	3,000	1,500	800			5,200
6 Ex. Chair	800	800	800			2,400
12 Conference chairs		600	600			1,200
30 Classroom chairs		2,000				2,000
2 Secretary chairs	300					300
2 Typing tables	300					300
6 File cabinets	1,200	1,200	1,200			3,600
2 Work Tables	300		300			600
2 Conference tables		500	500			1,000
3 Bookcases	500	500	500			1,500
2 Storage cabinets	500		500			1,000
Library Materials		1,000	2,500	1,000	1,000	5,500
Sub Total	14,200	20,100	10,700	1,000	1,000	47,000
Household Furnishings						
25 Beds for Training Dormitory		5,000				5,000
1 Set of Furniture for Instructor Dormitory		5,000				5,000
4 Sets of House Furniture for U.S Team (at $10,000 including freight)	40,000					40,000
Furniture for 2 on-site guest houses	20,000					20,000
Sub Total	60,000	10,000				70,000
Total All Commodities	125,000	112,000	46,000	1,000	14,000	298,000

160

TABLE K-4-6: OPERATING COSTS, CONTINGENCIES AND INFLATION

($ 000)

	PROJECT YEAR					
	1	2	3	4	5	TOTALS
PROJECT ADMINISTRATION						
1 admin. assistant	10	10	10	10	10	50
1 secretary	10	10	10	10	10	50
1 driver	2	2	2	2	2	10
Sub-Total	22	22	22	22	22	110
Team office rental-Bujumbura	12	12	12	12	12	60
Sub-Total	12	12	12	12	12	60
HOUSE RENTAL						
Temporary rental housing Gitega (3)a/		30				30
Housing rental in Bujumbura:						
Operations Specialist	12	12	12	12	12	60
1 Team Member b/	-	-	-	-	-	-
Sub-Total	12	42	12	12	12	90
VEHICLE MAINTENANCE & FUEL						
Pick-ups and vans	7	28	35	35	35	140
Motorcyles	-	2	4	4	4	14
Bicycles	-	1	2	2	2	7
Sub-Total	7	31	41	41	41	161
EXPENDABLE SUPPLIES						
Fertilizer (50 tons)	-	18	-	18	-	36
Seed handling supplies	-	4	2	2	2	10
Office supplies	3	3	3	3	3	15
Sub-Total	3	25	5	23	5	61

a/ Assuming construction of staff housing by local contractor and not completed until the end of year 2 of the project.

b/ Covered by savings from not constructing guest house at Karuzi. The third staff house will serve as a guest house instead.

TABLE K-4-6: OPERATING COSTS, CONTINGENCIES AND INFLATION Cont.

($000)

	PROJECT YEAR					
	1	2	3	4	5	TOTALS
FIELD SURVEY TEAM						
Enumerators (4)	-	10	10	10	10	40
Supervision (1)	-	4	4	4	4	16
Incidental Travel .	-	2	2	2	2	8
Miscellaneous Supplies	-	2	1	1	1	5
Sub-Total	-	18	17	17	17	69
CROP INSURANCE FUND		10	10	10	10	40
MISCELLANEOUS RESEARCH EXPENSES		5	5	5	5	20
TOTAL OPERATING COSTS	56	165	124	142	124	611
TOTAL BASE COSTS	1,171	1,329	1,115	1,029	1,012	5,656
Contingencies (10%)	117	133	112	103	101	566
Sub-Total	1,288	1,462	1,227	1,132	1,113	6,222
Inflation factor (12%)	-	(0.12)	(0.25)	(0.40)	(0.57)	
Inflation cost	-	175	307	452	634	1,568
TOTAL AID CONTRIBUTION	1,288	1,637	1,534	1,584	1,747	7,790

TABLE K-4-7: SUMMARY OF GRB STAFFING AND TRAINING ASSIGNMENTS 1/
(PERSON YEARS)

ASSIGNMENT	LEVEL OF TRAINING	PROJECT YEAR 1	2	3	4	5	END OF PROJECT
Training:							
Long-term	I.Ag[3]	1	2	1	0.5	-	-
to	Lic.[4]	4	5	4	2	0.5	-
Medium Term[2]	I.Ag.	-	-	1.5	2	1	-
	ITAB	2	2	1	1.5	1	-
ISABU	I.Ag/ M.Sc.	-	1	3.5	4.5	6.5	7
	ITAB[5]	-	1	2	2.5	3	3
	ITAB	-	-	1.5	0.5	-	
MOA	I.Ag./ M.Sc.	-	-	-	1.5	2	3
	ITAB	-	-	0.5	1	2	3

1) From Annex Tables F-4 and K5-2

2) Eighteen months in general, through actual training time should be kept just under eighteen months in order to maintain the trainees right to receive their local salary while on overseas training.

3) Ingéneur Agronome

4) License in economics or service

5) MAB plus medium-term training provided by the project.

X163

TABLE K-4-6: GRB LIFE OF PROJECT CONTRIBUTIONS AND POST PROJECT RECURRENT COSTS - PERSONNEL

($000)

Expenditure Category	PROJECT YEAR 1	2	3	4	5	Life of Project Total	Post Project Period 6	7-10
ISABU								
Project Dir/Station Chief($9000p.y)	9.0	9.0	9.0	9.0	9.0	45.0	9.0	9.0
Project Coordinator (0.25at $8000/yr)	2.0	2.0	2.0	2.0	2.0	10.0	-	-
Research Staff: I.Ag./M.Sc. at $8000/yr	-	8.0	28.0	36.0	52.0	124.0	56.0	56.0
ITAB(at $6000/yr)	-	6.0	12.0	15.0	18.0	51.0	18.0	18.0
ITAB(at $5000/yr)	-	-	7.5	2.5	-	10.0	-	-
Technical Assistant (at $2500/yr)	-	2.5	5.0	7.5	7.5	22.5	7.5	7.5
Driver(at $1300/yr)	-	1.3	1.3	1.3	1.3	5.2	2.6	2.6
Permanent Laborers (at $1000/yr)	-	5.0	15.0	20.0	20.0	60.0	20.0	20.0
Temporary Laborers (at $300/yr)	-	4.5	13.5	18.0	18.0	54.0	18.0	18.0
Secretary (ar $2500/yr)	-	2.5	2.5	2.5	2.5	10.0	2.5	2.5
	11.0	40.8	95.8	113.5	130.3	391.7	133.6	133.6
MOAL								
Professional Staff I.Ag/M.Sc. (at $8000/yr)	-	-	-	12.0	24.0	36.0	24.0	24.0
ITAB(at$6000/yr)	-	-	3.0	6.0	12.0	21.0	18.0	18.0
Monitors (at $1300/yr)	-	19.5	39.0	39.0	39.0	136.5	39.0	39.9
Sub Total	-	19.5	42.0	57.0	75.0	201.5	81.0	81.0
Overseas Trainees								
Medium term (from Table F.7)	10.0	10.0	15.5	21.5	12.0	69.0	-	-
Short term (at $600/yr)	2.6	5.4	5.4	5.4	5.4	24.2	-	-
Sub Total	12.6	15.4	20.9	26.9	17.4	93.2		
Total Personnel	23.6	73.2	156.2	195.2	220.2	668.4	214.6	214.6

TABLE K-4-9: GRB LIFE OF PROJECT CONTRIBUTIONS AND POST PROJECT RECURRENT COSTS - OTHER

Expenditure Category	PROJECT YEAR 1	2	3	4	5	Life of Project Total	Post Project Period 6	7	8-10
Construction/ Reconstruction									
Renovation (3 at $15,000)	45.0	-	-	-	-	45.0	-	-	-
Houses (4 at $50,000)	200.0	-	-	-	-	200.0	-	-	-
Offices and Storage room	100.0	-	-	-	-	100.0	-	-	-
Sub Total	345.0	-	-	-	-	345.0	-	-	-
Land (250 Hectares)	122.0	-	-	-	-	122.0	-	-	-
Vehicles									
2 -half ton pickups (at 13,000 ea)	-	-	-	-	-	-	26.0	-	-
10 Motorbikes (at $1600 ea.)	-	-	-	-	-	-	4.0	4.0	4.0
50 Bicycles (at $200 ea.)	-	-	-	-	-	-	2.5	2.5	2.5
Vehicle Maintenance	-	-	-	-	-	-	14.0	14.0	14.0
Sub Total							53.0	20.5	20.5
Equipment Replacement	-	-	-	-	-	-	30.0	30.0	30.0
Expendible Supplies	-	-	-	-	-	-	5.0	5.0	5.0
Utilities	3.0	3.0	3.0	3.0	3.0	15.0	6.0	6.0	6.0
Total Other	470.0	3.0	3.0	3.0	3.0	482.0	94.0	68.0	68.0

PROPOSED CALENDAR OF EVENTS

Project Month	Major Actions	Primary Responsibility
0	AID/W review and project authorization	AID/W
1	Project Grant Agreement signed	AAO/GRB
2	Contract PIO/T drafted, submitted AID/W	REDSO/AAO
2	PIO/C for initial vehicles, furniture, and appliances support completed and approved but not issued.	REDSO/AAO
3	Begin construction prequalification and preparation, analysis of responses, complete IFB	GRB,AAO REDSO
3	Initial conditions precedent met	GRB
3	Initial PIO/T and PIO/C is issued	AAO/REDSO
3	RFP to universities on short list	AID/W
4	Short list of U.S. universities established and approved.	REDSO/AAO/GRB
5	University proposals received	University/AID/W.
6	University Contract Selection	GRB,REDSO
6	Complete construction pre-qualification and IFB	GRB, AAO, REDSO
6	First Quarterly Implementation Review (every 3 months)	GRB,AAO
7	University Contract Signed	GRB. Contractor,AID/W
7	AID approval of construction IFB, IFB handed out	AAO,REDSO,Contractor
8	First vehicle purchased, initial appliances and furniture arrive.	AAO/GRB
8	House rented for Administrative Specialist	AAO
8	Administrative specialist arrives	
9	Training plan completed.	TA Contractor/GRB
9	Office space rented in Bujumbura for TA Team.	AAO/Contractor
10	Construction Contract Award, AID approval of construction (completion of subsequent CP)	GRB/REDSO
10.	Furniture and appliances ordered	Contractor

Project Month	Major Actions	Primary Responsibility
11	Contractor submits interim implementation program to GRB and USAID	GRB
11	Construction begins at Murongwe and Karuzi	GRB/CONTRACTOR
11	First participants nominated - 3 M.Sc., 3 non-degree, LT, plus one int. center	GRB
11	Project vehicles procured locally	AAO/Contractor/Admin.
11	First temporary housing rented in Gitega	Team Leader/GRB
12	Arrival of Team Leader at post	TA Contractor
12	PIO/C issued and Procurement orders for other equipment	TA Contractor/AAO/REDSO
13	Trainees depart	GRB/TA Contractor
15	Logistic Support commodities arrive	TA Contractor
16	Arrival of other two technicians on TA team	TA Contractor
17	Informal survey of farming systems in first commune (Mutaho-Murongwe)	Contractor/GRB
18	Final contractor work plan due progress report.	Contractor/GRB
18	Short term trainees return (int. center)	Contractor
18	Begin limited on research station trials (Murongwe)	Contractor/GRB
19	Analyze results from farming systems survey.	Contractor
21	Second year trainees depart	Contractor
21	Begin research trials -first field trials of varieties that appear promising, full on station trials at Murongwe.	Contractor/GRB
23	Construction completed at Murongwe and Karuzi	Construction Contractor
23	Formal survey Murongwe farming systems	Contractor/GRB

Project Month	Major Actions	Primary Responsibility
24	First semi-annual report and detailed work plan update (these reports are due every six months)	Contractor
24	Conduct first Murongwe in-service training program	Contractor/GRE
25	Complete formal survey analysis-Murongwe	GRE/Contractor
26	Brief in-house evaluation -PES	AAO/REDSO/Contractor/ GRB
27	Begin informal survey of Karuzi	Contractor/GRB
29	Analyze results of informal survey of Karuzi	CONTRACTOR/GRB
29	Begin limited trials at Karuzi station	Contractor/GRB
31	First Non Degree participants return	Contractor/GRB
32	Analyze results of Karuzi trials	Contractor/GRB
32	Administrative specialist HL/RTP or replacement	Contractor
32	Formal Confirmatory survey of Karuzi	Contractor/GRB
33	Third group of participants leaves for U.S. (last M.Sc. participants.	TA Contractor
33	Continue modified trials of promising innovations, larger number of on farm trials at Karuzi	Contractor/GRB
33	Start of in-service training by TA team to ISABU and Department of Agronomy agronomists in farming systems for Karuzi.	TA Contractor/MinAg
34	Analysis of Results of formal, confirmatory survey of Karuzi	Contractor/GRB
35	Field days and demonstrations at and Murongwe.	Contractor/GRB
36	Mid term project evaluation, tentative decisions regarding continuation, modification, expansion	AAO/REDSO/Contractor GRB outside experts
37	Team Leader HL/RTP or replacement	Contractor
40	Remaining Technical Assistance Advisors eligible for HL/RTP	Contractor
41	Continue all programs already begun	Contractor

Project Month	Major Actions	Primary Responsibility
41	Initiate seed production of improved varieties if warranted.	Contractor/GRB
41	Increase complexity of innovations in farming systems including (if possible) livestock production and soil conservation practices.	Contractor/GRB
43	Second group non-degree participants return.	Contractor/GRB
43	First M.Sc. trainees return	Contractor/GRB
45	Make some attempt at having ISABU try farming systems approach at other centers and stations.	Contractor/GRB
46	Fourth group of non-degree participants leaves for training	Contractor/GRB
53	Continue all programs begun to date	Contractor/GRB
55	Third group non-degree and second group of M.Sc. participants return	Contractor/GRB
56	End of second tour Administrative Specialist leaves.	Contractor
58	Last non-degree participant leaves for training	Contractor/GRB
62	Final evaluation and determination of follow on activities	GRB/AAO/REDSO/ Contractor and outside experts
63	End of tour for team leader	Contractor/GRB
63	End of tour for T.A. Staff	Contractor/GRB
63	End of project activities (except for residual training)	AAO/GRB/Contractor
67	Third group M.Sc. and fourth group non-degree participants return	GRB/CONTRACTOR
79	Last group non-degree trainees return	Contractor/GRB
79	Final Contribution date	AAO/GRB
84	Ex-post evaluation (not project funded)	AID/GRB

X169

Consultants Report
TOM ZALLA

Contract No. AFR-0135-C-00-2080-00

Small Farming Systems Research Project

A. Exchange of Socio-Economic Information on Research Results

1. The Farming Systems Key

According to current thinking agricultural researchers need to take into account a substantial array of socio-economic factors in addition to agronomic factors in order to increase the probability of farmers accepting proposed innovations. Observers of the research diffusion process have come to this conclusion after witnessing repeated failures of farmers to adopt what otherwise appear to be sound improvements. Such things as family size, sex defined work roles, family distribution patterns for various commodities, farmer resource base, cash income and others can have a strong influence on the way farmers view a particular technology.

This increase in awareness of the complexity of the farming system and the range of factors which can influence farmer behaviour was sorely needed. However, there is a growing danger of making the problem too complex and of losing sight of the overiding importance in most circumstances, of simple agronomic and economic factors. Usually, I do not believe it will be necessary to go much beyond the obvious.

As we spoke to researchers, extension agents and farmers it became quite clear that complex social factors are not at the root of the failure of farmers to adopt improved technologies in parts of Burundi. Rather such obvious factors as the unavailability of fertilizer, the failure of the technology to do quantitatively better than local varieties on the infertile soils which many farmers are using and the absence of a market for the increased output were found to be key constraints. These are, by and large, areas of traditional concern and do not require elaborate socio-economic surveys to discover. They only require talking directly to farmers.

The strength of the farming systems approach is just that. It incorporates the farmer into the technology diffusion process. It asks him for his reaction and his point of view. As long as someone is doing this, and researchers will listen to the advice and observations of those who are, then effective research is just a matter of time.

This does not mean it will be quick. Poor soil fertility will not yield to quick fixes. Fertilizer is not available to crops until soil conditions are favorable. Creating more favorable soil conditions is something farmers have been working on for centuries. However, direct researcher farmer contact at least establishes the real potential for finding solutions.

Do not overlook the possibility that good research has not been adopted by farmers simply because it has not reached him. Lower level extension agents are frequently very poorly trained and poorly motivated. Do they actually get out to see farmers and if they do, is what they tell them correct? There is much evidence that the answer to both questions is much too often a resounding no in large parts of Africa.

The advantages of the SFSR project is that it trys to marry education, research and extension much more closely than in the past. Coupled with more effective education, research and extension management systems the potential impact of this marriage is enormous. Better training leads to greater confidence which leads to more openess towards farmers and more respect for what the agents have to say both by farmers and researchers. This establishes the effective communciation that is at the key to farming systems research.

In Burundi I do not think it is correct to say that links between research and extension are so weak. The problem is that the flow of information is uni-directional - from research to extension. The system does not elicit nor respect ideas from the bottom. I think this explains some of the fear of pushing too soon onto farmer fields with experimental trials. Researchers are supposed to know what is good for farmers. Admitting that they sometimes do not challenge many of the feelings that often lead people to become researchers in the first place.

Changing these attitudes will take time. Both research stations and schools need to gain respect for the farmer. Bringing them into contact with him in the content of a problem which they will often not be able to solve without his input should help them achieve this. The SFSR project is an excellent first step in this direction.

2. Receptivity of ISABU Researchers to Farming Systems Research

As in the U.S. and the International research community in general Belgian agricultural scientists are becoming increasingly sensitive to the need to adopt a systems perspective for doing research on small farmer agriculture in developing countries. For the past couple of years the representatives from Belgium involved in evaluating and programming research have been urging for more attention to extension and farmer adoption of research results and less to standard variatal trials. According to Dr. Schalbrok, ISABU and the Belgians have been trying to recruit an extension specialist to aid in this effort but have, so far, not been successful in finding the kind of person needed. ISABU researchers would, therefore, welcome the USAID effort to establish adaptive research teams that would address these problems. It does not appear to be true that the Belgians are less sensitive to this issue than the Americans, though they may approach it from a slightly different perspective. Indeed, they may have a greater appreciation for the unique professional and personal qualities that will be necessary to make such an effort bear fruit.

Already a number of ISABU researchers are working more closely with farmers. Such an approach requires much greater logistical support than on station activities, however. It also requires a greater willingness to subject one's work to the scrutiny of fellow researchers and farmers.

X171

Unless farmers and extension agents are viewed as co-researchers and equal partners in the research process, such an approach threatens researchers who see unsuccessful attempts to introduce new techniques or varieties as personal failures. It also threatens researchers who think they know farmers problems well enough to carry out research with minimal farmer input. It is not at all clear that Belgian researchers are less willing than other researchers at ISABU to make the kind of shift in approach envisioned by the Small Farming Systems Research Project. It would seem wise, therefore, to view them as collaborators rather than adversaries of AID's attempt to add an adaptive research component to Burundi's research program.

B. Using Other Agencies, Institutions and Mechanisms for Developing, Testing and Extending Research Results

1. Faculty of Agronomy

As in most francophone countries the Faculty of Agronomy, being part of the national University, comes under the authority of the Ministry of Education rather than the Ministry of Agriculture. Students spend their first two years in the Faculty of Science taking basic sciences and other background coursework. The last three years of the five year program for agronomists are then spent at the Faculty of Agronomy itself, taking courses in technical agriculture. During their last year students are required to write a memoire, a piece of research falling somewhere between a term paper and a masters thesis. In order to gather material for this, students are assigned to a public agricultural institution for up to six months. Upon successfully completing their exams and memoire graduates receive the "diplome d'ingénieur agronome", having full equivalence with a similar Belgian degree. Given the heavier course load that agriculture students are required to take in the Faculty of Science, this degree is more or less equivalent to an American masters degree in general agriculture. It is, however, frequently not accepted as such by American graduate schools.

Many students of the Faculty of Agronomy write their memoire in conjunction with ISABU research activities. In addition all of them spend one month visiting the three principal ISABU research stations at Luvironza, Kisozi and Mosso. They do, therefore, acquire a reasonably good understanding of how a research station operates.

These activities present an excellent opportunity to incorporate both students and faculty in the research development and diffusion process. Unfortunately, ISABU accepts only the students' memoires as an integral part of its ongoing research activities. University faculty are discouraged from taking an active part in the institute's research program independantly of the student memoires. They may collaborate with and assist ongoing research activities, but this requires long distance travel and independant logistical support which the faculty does not have. Belgium will not provide financing for a separate university faculty research program nearer to the campus on the grounds that it would constitute wasteful duplication of ISABU's activities. Given the distance

between the University and the nearest ISABU research station this effectively prevents the Faculty of Agronomy from incorporating a substantial active research component in its ongoing education program no doubt to the deteriment of its training program and the development of a sound inventory of knowledge useful for research.

Both the University and the Burundi Government actively encourage financing of research activities at the University by other donors. Apparently, ISABU is also supportive of such efforts, provided they are integrated with - or at least not duplicative of - its own ongoing activities. The Swedish International Foundation for Science, for example, recently gave the University $10,000 for research on small ruminants and poultry, areas currently neglected by ISABU. The Small Farming Systems Research Project may want to consider contracting with the University in the same way for similar kinds of research that appear to offer potential but which ISABU is unable to do. This would permit a fuller use of the research skills of the six expatriates and 4-6 Burundi who make up the Faculty of Agronomy. More importantly, it would have a favorable influence on the training given to agriculture students.

2. Faculty of Economic Science and Administration

The Faculty of Economics has a rural economy specialization that includes rural sociology and agricultural development courses. Currently there seven students in the 3rd and 4th years in rural economy. Students do not take any technical agriculture but their training program does include various assignments to do simple research in rural areas.

The Faculty is interested in expanding meaningful research opportunities for its students. It recently created the University Center for Research on Economics and Social Development (CURDES) to provide a structure for contract research work for outside agencies. CURDES uses the faculty's students in its research work and is currently carrying out a study financed by the Swiss. CURDES would be a likely recipient of a SFSR project research grant once a relevant topic for study is identified. Currently there are no links whatsoever between CURDES and ISABU.

3. ITAB

The new ITAB facility at Karuzi will offer an excellent opportunity for feeding research results more quickly into the extension process. With a research farm nearby students will be exposed to more relevant field work and current research results. Farming Systems Research methods can easily be incorporated into the ITAB training program using the ART's as on-the-job training mechanisms.

4. The SFSR Project Participant Training Program

USAID can make a substantial contribution toward strengthening links between research education and extension in Burundi by gearing the training component of the SFSR project more toward research. Those persons being trained for extension work should have a firm grasp of

research procedures and should understand how ISABU functions. In this way they will be more sensitive to differences in approach that might otherwise perpetuate communication barriers between research and extension. This can be accomplished by requiring all students trained by the project to write their senior year memoire or M.Sc. thesis on a topic that is an integral part of ISABU's research activities. A university contractor implementing the project may under the right circumstances, be willing to accept this. One of the technical assistance team members could serve as committee chairman. Other committee members could be drawn from ISABU researchers or Faculty of Agronomy teachers. Close collaboration between the field researchers and on campus advisors through a campus coordinator could help students define especially useful topics for their papers.. In this way there would be no need to return to the U.S. for examination. If necessary, a key faculty member in the states could chair the examination while in country on a useful short term consulting assignment.

This approach has been incorporated into the revised PP. However, the mission must be careful in selecting a university contractor to insist on their agreeing to this approach as a condition for granting the contract. Many universities are becoming increasingly flexible in this regard so it is possible to find agreeable contractors.

5. Social and Religious Organizations

While the other three sections discuss institutions and approaches more likely to contribute to the diagnosis of farmer problems and the development and evaluation of research that addresses them, other institutes and social groups offer potential for extending new technologies. The Foyer Sociaux discussed in the Technical Analysis will provide excellent vehicle for passing most recent research results onto farmers through its action program. Mission groups and PVO's working in agriculture can also provide useful support for diffusing new innovations. The extension service should foster close collaboration and communications with such groups.

C. Other Issues Concerning the SFSP Project

1. Paying Local Salaries

In our discussions with Mr. Kafuera, the Director General of Agricultural Planning and the Director of Agronomy on Friday, November 12, USAID agreed to pay all operating costs for the Karuzi station. I believe we excluded wages and regular salaries but included seasonal labor. The question of utilities was not mentioned but, presumably, these would be paid by USAID as well. In hindsight, I think it was a mistake to agree to pay any labor other than the salaries of a few enumerators and survey supervisor where the paramount necessity of maintaining strong discipline over data quality is an overiding consideration. Public sector work discipline in Burundi is not good. Once the GRB is removed from the responsibility for financing it I have no doubt it will get worse. This may very well create a host of problems for the ART expatriate team members and for the successful operation of the Karuzi research station. I strongly urge the mission offer to provide an additional building (such as the currently budgeted training dormitory for Murongwe which was not foreseen at the time of our meeting with the Director of ISABU), in exchange for ISABU picking up all labor costs other than the

174

field survey teams. While ISABU may be reluctant to agree to this I suspect any bigger share of total costs borne by AID, given the large construction component already, would lead to substantial opposition and possible rejection of the project in Washington.

2. Research Programming and Coordination at ISABU

The research program of ISABU is worked out each year between researchers, ISABU department heads, a resident Belgian research coordinator and two representatives of the University of Louvain who comes to Burundi for this purpose. Each department head then submits his proposed program of research for the coming year to ISABU's Research Direction Committee for approval. This committee includes the Directors General of Agriculture, Livestock and Planning, respectively, the Director of the Department of Agronomy of the Ministry of Agriculture and Livestock, the Director General of ISABU, the technical advisor to the Ministry of Plan, the two representatives of the University of Louvain, the head of the Belgian research project in Burundi, the liaison officer at the Belgian Embassy, the head of the Belgian technical assistance program in Burundi and, as an official observer, the Dean of the Faculty of Agronomy. It appears that the Research Direction Committee makes only minor changes in the research programs presented to it for approval.

Once the annual research program is established, individual researchers prepare monthly and quarterly reports on its progress. Except for the first and last quarterly reports which lay out planned activities for the year and the accomplishments, respectively, the reports are generally brief and do not take up a great deal of researchers' time. Logistical support for the departmental research programs is programmed for the entire year and funneled through the individual station directors by the Administration service of ISABU. A Belgian research coordinator attached to the Director General's office ensures coordination. It appears that station directors are becoming less and less influential in the conduct of research programs as the technical departments become stronger and more self directed.

3. French Summary of SFSR Project

The SFSR project summary discussed at the meeting with the Director General's of ISABU and Agricultural Planning and the Director of Agronomy on Friday, November 12 is attached as an annex to this report.

Annex L

PROJET DE RECHERCHE SUR LES SYSTEMES AGRICOLES AU NIVEAU DES PETITES FERMES

BUT DU PROJET

Collaborer avec le Gouvernement de la République du Burundi pour developper des institutions agricoles capables de fournir des technologies mieux adaptées au milieur et aux moyens des petits fermiers afin d'apporter à ces derniers des connaissances et techniques nécessaires pour améliorer leurs capacité de production alimentaire et leurs niveau de vie.

PRINCIPES DE DEPARTS

1. L'étude du système agricole des petits paysans par les chercheurs et les vulgarisateurs avant d'initier la récherche appliquée provoquera une orientation de la récherche qui apportera un eventuel résultat beaucoup plus disposer à être adoptée par les paysans.

2. Les paysans doivent participer dans ces études afin de vérifier l'exactitude de leurs conclusions.

3. Ces études ne doivent pas retarder l'identification ni la diffusion des technologies améliorées.

4. Avant d'être testé dans les champs des paysans chaque technologie à lui proposer doit donner des résultats satisfaisant dans le centre de récherche et dans les mêmes conditions auquel un paysan typique se trouve.

APPROCHE A LA RECHERCHE DU PROJET

1. Phase diagnostique

a) Grouper en milieu rurale des zones homogènes de recommandation (c'est à dire - un groupe ayant un système de cultures et de production plus ou moins homogène). C'est un travail d'une à deux semaines.

b) Faire une enquête informelle pour identifier les contraintes principales, les pratiques actuelles des paysans individuels pour resoudre ces contraintes, et voir la receptivité des paysans aux approches qui peuvent être proposés par la recherche. Cette enquête est faite directement par les membres de l'équippe de la récherche adaptée (FSR) avec les paysans, sans intermédiaire des enquêteurs. Cette enquête informelle dure entre 2-4 semaines, selon l'expérience de l'équippe.

c)Faire une enquête formelle d'estimations pour vérifier les conclusions de l'enquête informelle et de quantifier les données de base contre lesquelles l'efficacité des technologies apportées aux paysans par la recherche seront mesurer. Cet étape dure à peu près 2 à 3 mois, selon l'expérience de l'équippe.

2. Phase de dessin de recherche

a)Définir les priorités pour la recherche selon ce qu'on a appris dans l'enquête informelle et selon l'inventaire des technologies, des variétés et de systèmes de culture connus par la recherche.

b)Faire la sélections préliminaire de ces approches, ces technologies ou bien ces systèmes de culture selon les résultats des essais fait sur la station. Cette sélectionne est fait dans les conditions qui sont les mêmes avec les paysans dans le domaine de recommandation qu'ils soient des sols peu fertiles, la culture associé ou d'autres conditions. Cette étape peut durer d'une seule saison jusqu'à plusieurs, selon l'inventaire actuelle des résultats de recherche au préalable.

3. Phase de Vérification des résultats.

a)L'essais de technologie améliorée sur les champs des quelques (8-10) paysans typiques de la domaine de recommandation. C'est toujours une étape de la recherche non pas une étape de la vulgarisation. La participation du paysan lui-même est essentielle pour l'evaluation de l'aptitude de la technologie. S'il la trouve bien on passe à la prochaine étape.
Si non, on reconsidère l'approche selon les observations des chercheurs et des paysans et on refait les essais.

b) Les essais de technologie sur les champs de 50-70 paysans sont choisis plus au hasard pour confirmer l'efficacité et l'acceptabilité de la technologie par les paysans.

4. Phase de vulgarisation

Le projet essayera d'approches differentes vers la vulgarisation afin d'identifier un système efficace dans les conditions de pénurie des moyens

DUREE DU PROJET ET DU PROGRAMME

1. La première phase du projet sera cinq ans. La première année sera une période de construction sans que les techniciens soient sur place. La première phase sera orienté vers les communes de Mutaho et Kayanza.

2. Si la première phase va bien et le concept du projet se renforce, une deuxième et même troisième phase de son diffusion sur les autres stations du centre est envisagé. On peut envisager aussi un renforcement des efforts de la recherche dans les domaines de fertilité des sols, les systèmes de cultures, le fixation d'azote et l'intégration de l'élevage avec l'agriculture.

177

CONTRIBUTIONS DE L'USAID

1. Personnel

Un Agronome
Un agroéconomiste
Un spécialiste en vulgarisation
Un spécialiste en opérations et logistique.

2. Bâtiments

a. Karuzi

1 Maison de passage
3 Maisons pour les expatriés
1 Dortoir de 3 chambres.

b. Murongwe

1 Maison de passage
1 centre de formation
1 Dortoir de 3 chambre

3. Equipement déjà prévus dans le dossier antérieur du projet.

4. Formation

a. Longue terme diplômé

7 M.Sc. Américain

4 Agronomes
2 Agro-économistes
1 Vulgarisation et communication

b. Moyen terme - non diplômé

5 ingénieurs agronomes
5 techniciens de l'ITAB
1 license en économie.

CONTRIBUTIONS DU BURUNDI

1. Personnel

1 Agronome/chercheur en fertilité du sol/Chef du station
3 Agronomes homologues en années 2-5 du projet
6 Agronomes homologues en années 3-5 du projet
10 Autres cadres à former pendant des années 1-5 du projet
5 pour le MDA, les autres pour l'ISABU.
Tous les techniciens et la main d'oeuvre de station.

178

2. Bâtiments : Karuzi

Logement pour sept agronomes Barundais
1 Bureau et un magasin

TITULAIRE DU PROJET - OPTIONS

1. ISABU pour l'agronome et l'agro-économiste et le Département d'Agronomie pour le vulgarisateur comme prévu dans le dossier du projet actuel.

2. ISABU pour tous les trois techniciens - Notre option de préférence

   a. Création d'un nouveau Département de Systèmes Agricole et de Vulgarisation.

   b. Forte collaboration entre ce nouveau département et les autres départements de l'ISABU dans la programmation de la récherche et l'intégration du travail.

   c. Collaboration dans les expériences à Karuzi par les autres chercheurs de l'ISABU dans la mesure qu'on a besoin de leur expertise.

   d. Conduit des expérimentations dans la station dans les mêmes conditions que chez les paysans.

   e. Financement autonome vis à vis les réserves de l'USAID

   f. Le vulgarisateur sera employé par le département d'Agronomie mais affecté à l'ISABU. Forte collaboration avec le Directeur d'Agronomie.

3. Département d'Agronomie pour tous les trois techniciens

   1. Collaboration avec l'ISABU à déterminer

   2. Lieu de travail à déterminer.

4. Projet Autonome pour tous les trois techniciens.

   1. collaboration avec l'ISABU à déterminer.

   2. Lieu de travail à déterminer.

Prime L

UNITED STATES GOVERNMENT

memorandum

DATE: November 16, 1981

REPLY TO ATTN OF: Carl E. Ferguson, Agronomist/Soil Scientist Consultant

SUBJECT: Report on Items Listed in Article I Statement of Work
Contract AFR-0135-C-00-2032-00

TO: Abbe Fessenden, Program Officer

Attached is my draft report covering the items examined in the Statement of Work. By mutual agreement the items which were covered at some length in the revised Project Paper are covered herein only by reference to their particular location in the Project Paper.

Persons Contacted

Joseph Kaferera - Director General ISABU
Oscar Ndabikingiye - Director Agricultural Extension, Department of Agronomy
Salvator Sahinguvu - Director General, Agricultural Planning
J.J. Schalbroeck - Chief of the Food Crops Division ISABU
E. Karasira - Chief of Agrostology Group, Kisozi Research Station
Jean Krawe - Chief of Administration ISABU
R. Brinckaert - Dean, Faculty of Agronomy
C Mathieu - Prof. of Soil Science, Faculty of Agriculture
Alexis Ntibakirabya - Minister of Agriculture and Livestock
Egide Niyonkuru - Director, Murongwe Station, ISABU
Vital Baranyikwiye - Director, Agric. Tech. Institute, Gitega
Director, Prof. Agric. School Kamutwa

George T. Bliss - AID Affairs Officer
Harold E. Fisher - Agriculture Development Officer
Abbe Fessenden - Program Officer
John McAlister - Project Manager, Kajondi Seed Farm.

(a) Review progress made in agricultural research during the past year, particularly research relevent to small farming systems and recommend how a farming systems project could mesh with/contribute to other programs.

This item is discussed at some length in Annex I of the Project Paper.

(b) Examine and make recommendations on the roles of ISABU, Agricultural Extension and the Agricultural technical institutions in light of carrying out an integrated farming systems applied research program

ISABU's contributions to the SFSA project will be threefold, (a) serve as a source of information, based on research, on the adapted crops varieties, plant and animal pest control measures, adapted forest tree species, soil fertility and conservation requirements, and to a limited extent, livestock

X180

management requirements; (b) provide basic or foundation seed of approved crop varieties to the extent that the Kajondi farm is unable to provide them; and (c) in its capacity as the sponsoring GRB agency, be an active participant in all aspects of project planning and operation.

Agricultural extension will second a member of its technical staff to serve as a counterpart for the expatriate Extension Specialist. He will continue to maintain contact with his parent agency being alert for any opportunity to facilitate the two-way flow of data and information on effective innovations in extension methods which may be useful both to the project and to the extension services.

The Agricultural schools, particularly the school at Karuzi should be an institutional beneficiary as well as a participant in certain aspects of the project. Students could participate in on-farm surveys and studies during their vacation periods and there may be innovations and technical findings arising from the project that are appropriate for inclusion in the school's practical training courses.

(c) Examine the question of how to make better use of soil science within the farming systems approach and how to take advantage of existing facilities and staff.

One of the important factors affecting the development of improved cropping systems is the soils of the area, their characteristics and use potentials.

Soil Science has developed and perfected methods for gathering and interpreting information about soils that is very useful for planning and carrying out agricultural development. Soil Scientists trained in soil survey and mapping techniques are able to classify similar soils into land use capability units and make agronomic interpretations about each group such as land use suitability (trees, pasture, cropland, etc.), identification of crops suited to the soils and crop management practices required, special practices needed for soil fertility maintenance and improvement such as liming, manuring, use of fertilizer, etc., and special practices that may be needed for erosion control.

I have proposed in Section III A 3 d that ISABU (Département de l'Aménagement du Milieu) or the University Contractor prepare a large scale soil and land use capability map covering the area included in the project. The land use capability maps to be useful must be accompanied by an interpretative text describing the items mentioned above. ISABU has the skills and equipment needed to make such maps. The American Agronomist team leader will know how to use the soils and land use capability information in planning small farming systems and in testing and demonstrating improved crop rotation, and crop management practices.

Reliable soils information obtained by trained soils specialists increases the chances that correct judgments will be made about soil management needs and probably would reduce the time required to develop through adaptive research the improved small farming systems.

181

(d) Examine and make recommendations regarding ISABU Agricultural Research linkages with the University of Burundi, research program in nearby countries and international agriculture research institutions.

As noted in Annex .F. of the Project Paper ISABU maintains contact with, and receives plant and seed selections from the International agricultural research institutions as well as the National Agricultural Research Organizations in a dozen or so different countries.

It is important that these linkages be continued and strengthened. The Small Farming Systems project will contribute to strengthen ties through sponsoring short term training programs for Burundians at the research centers and attendance at special seminars and training courses both at the Centers and in the U.S.

During the 1981-1982 school year ISABU staff members supervised several students who were in their final year at the Faculty of Agronomy in the preparation of their theses. In addition, ISABU was responsible for organizing and overseeing all the practical agricultural courses required for second year students who are candidates for the Ing. Agronome degree.

(e) Examine and make recommendations on how this project would tie into other Ministry of Agriculture and Livestock programs such as aforestation and livestock.

1. Livestock

Although not a principal element in the Small Farming Systems project, I believe that (a) in view of the proven value of farm manure for increasing crop production and (b) for its role in increasing crop response from chemical fertilizers, livestock should be included in the early stages of the project. The average size farm in the Karuzi basin is 2.2 hectares and in rural zones there are open pasturelands. This size of farm and the presence of communal grazing lands would seem to indicate that there may be good possibilities for including livestock in the farming systems of a significant number of farmers. Research under the project to find a feasible way to include livestock in the project is proposed in Section III A 3 b of the revised Project Paper.

Livestock can also be efficient channels for biologically transferring soil fertility (N, P.K. etc.) from soil of extensive grazing lands and concentrating them on a smaller area of cropland. A more efficient way to effect this transfer, but requiring considerably more labor is the cut and carry system. In this system the animals are penned and forage is cut from fields, along roads and drainage ways etc., and brought to the animal(s). Nearly all the manure produced could be saved by using this system of livestock feeding and management.

If livestock are included, and I believe they should be, a source of cows with a higher milk production potential than the females in the typical unimproved herd should be found. ISABU has done some cross breeding experiments with success using the Ayrshire and Ankole breeds. These crosses, we were told, gave offspring which produces 2-3 times as much milk as the native cows when grazing on the same pasture.

X182

There would appear to be plenty of palatable forage in much of the project area particularly during the rainy season which could be had simply for the cutting. This system would be particularly effective if cropping systems research shows how to incorporate forage legumes such as Pueraria, Stizolobium or other tropical legumes into the crop rotations.

I understand from Dr. Boynton, the Public Health Family Planning Consultant, that protein shortage or kwashirkor disease, is common in children in some of the rural areas of Burundi. The project might collaborate with one of the health programs for the purpose of demonstrating the nutritional benefits of having "a milk cow on every farm".

The first steps in planning a livestock component of the project should be during the diagnostic stage when the survey team would determine the kind and number of livestock on each farm, the availability of non cropland for pasture, and the possibilities of on-farm production of forage.

2. Afforestation

The planting of selected forest tree species might well be considered at some future stage of the project. The purpose of the tree plantings would be (a) to provide firewood, (b) poles for construction and very importantly (c) contribute to the fight against soil erosion by reducing the rate of water runoff during intense rainstorms.

Fortunately adequate applied research on screening local and introduced tree species for adaptability to different altitudes and rainfall has been done. Based on observation of forestry plantings and nurseries in Burundi it appears that the required skills and technology is available for a successful tree planting operation. One should consider including a small forestry component in the project at a future date, if the first phase of the project goes well and project extension is justified.

The land use capability maps, suggested in Section III A 3 c, would show the soils which should be planted to trees, those that are best be used for pasture and those soils which are suited for crop production.

(f) Examine and make recommendations on the roles of agricultural extension and technical schools for strengthening the linkages with research to facilitate extension of research results to farmers.

A missing element in the Extension/ISABU relationship which hinders transfer of research information to farmers use is the absence of personnel - usually designated in the U.S. as extension specialists - whose main tasks is to provide the professional linkage between research and the extension services. Normally they are extension employees who have had experience in research. They follow the applied research of the research agency(ies) whose results may be applicable at the farm level. They are responsible for taking the lead in seeing that the results are incorporated in the extension programs for the appropriate areas and at the appropriate times. In Burundi such specialists would also be responsible for the preparation in collaboration with ISABU and distribution of the "Fichiers Techniques" in which is described in detail how, when and where a given extension "theme" is to be applied at the farm level.

182

Normally there should be an extension specialist for each of the major subject matter areas of the extension program. For example in Burundi there might be one for the cereal crops (corn, sorghum and millet), one for the edible legumes (beans, soybeans, cowpeas and peanuts) and one for the vegetable crops (tomatoes, eggplants, onions, etc.), and one for livestock.

(g) Examine organizational linkages feedback from other programs and means of diffusion of results with ongoing seed proposed area agricultural/rural development projects.

I suggest that at the end of Project year 2, ISABU take the lead in organizing a yearly seminar to review, discuss and exchange information among all the area agricultural development projects. Such an exchange among the administrative and technical personnel should be useful since it might identify common problems that require a coordinated solution and technical information and innovations developed in one area might have immediate application in another.

It might be feasible and desirable for technical personnel to have shorter meetings at more frequent intervals to discuss common problems and exchange information.