PN-ABC-079

CDIE WORKING PAPERS

CDIE WORKING PAPER NO. 112

Case Studies of
A.I.D. Farming Systems Research & Extension (FSR/E) Projects

Case Study No. 7

Zambia Agricultural Development Research & Extension Project[1]
(611-0201)

by

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[1]This **CDIE Working Paper** is one of the case studies prepared for a cross-cutting analysis of A.I.D. FSR/E projects, A Review of A.I.D. Experience with Farming Systems Research and Extension Projects (**A.I.D. Evaluation Special Study**, forthcoming). The 12 FSR/E projects reviewed in this series are:

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Senegal Agricultural Research and Planning (685-0223)
Tanzania Farming Systems Research (621-0156)
Zambia Agricultural Development Research & Extension (611-0201)
Nepal Agricultural Research and Production (367-0149)
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Zambia Agricultural Development Research & Extension Project (611-0201)

The Zambia Agricultural Development Research and Extension Project (ZAMARE) was authorized, as a five-year project (Phase 1), in September 1980, for $12,515,000. The Project Grant Agreement with the Government of the Republic of Zambia (GRZ) was signed in late 1980. Technical assistance (TA) to ZAMARE was provided by the University of Illinois at Champaign-Urbana as lead university, Southern Illinois University, and the University of Maryland Eastern Shore.

While ZAMARE was anticipated to start in February 1981, the TA contract was not signed until December 1981. Further, the TA team personnel comprising the project's FSR/E component did not begin arriving in country until August 1982, and were not fully on board until October 1982. The TA team positions were team leader (an agricultural economist), maize breeder, soybean breeder, sunflower agronomist, farming systems economist, field agronomist, and Research Extension Liaison Officer (RELO).

The ZAMARE project was evaluated two times: the first evaluation in 1983 (Benoit, et al., 1983), the second in early 1985 (Yohe, et al., 1985; and Sutherland and Warren, 1985). Although the first evaluation recounts communication problems involved during ZAMARE's start up phase (Benoit, et. al., 1983), these were soon overcome. Accordingly, this case study is primarily based, unless otherwise noted, on the second evaluation which was conducted 31 months into the LOP of 60 months.

Concept - What was the basic technical idea underlying the project?

Some 40% of Zambia' population live in urban centers, this percentage being the highest of any African country south of the Sahara. GRZ policy, directed at satisfying urban sector food requirements via subsidized prices, has not stimulated economic growth in the rural sector. Further, with copper providing 90% of export earnings, agriculture contributes only 18% of the country's GDP, this figure being the lowest in Africa. Yet the number of the country's commercial farmers (about 500) and emerging commercial farmers (about 5,000) pales in comparison with the 600,000 small farmers producing nearly 60% of the grain marketed in the country. Among the factors identified in the PP as contributing to the poor performance of Zambian agriculture has been inadequate attention to developing agricultural technology tailored to the needs of the country's small-scale producers (SSPs).

With this background, the ZAMARE project's goal was "to assist the GRZ in improving the welfare of small farmers and increasing national food production through the development and adaptation of relevant technology." The project purpose was "to help the GRZ strengthen the agricultural research capacity of the Ministry of Agriculture and Water Development (MAWD) and to increase the effectiveness of the extension service in transferring relevant agricultural technology with special emphasis on small farmers." More specifically, the intent of the project was to strengthen the capability of the MAWD's Department of Agriculture (DOA) to conduct commodity and adaptive research aimed at developing and extending improved technology for cereal and oilseed crops grown by SSPs.

Zambia actively searched for over a decade to identify more effective ways to link the Ministry's research and extension programs. Initiatives included the LIMA system (an extension program designed around a farm input package for use on land units of 1/4 hectare), the Training & Visit system, and the Adaptive Research Planning Team (ARPT) system introduced in 1980. At the time the PP was prepared, the GRZ had made a decision that there would eventually be one ARPT for each province and an overall ARPT coordinator. The first ARTP was to be created in Zambia's Central Province (CP).

> The techniques and methodologies gained through the ARPT work in Central Province will provide guidance to MAWD in replicating the ARPT in other provinces. . . . It is planned that as the new agricultural technology is developed, it will be fed by the [RELO] of the ARPT into the [Training and Visit System] (PP, p. 25-26).

Administratively, the ARTP was to be located in the DOA's Research Branch, to provide feedback on small farmer production constraints to the Commodity Research Teams (CRTs) conducting experiment station-based research. The ARPT was to provide a mechanism to determine the technological requirements and capacities of small farmers, and to test new technologies at the farm level. Further, the ARPT would provide a means to link commodity and adaptive research within the Research Branch with the field-level personnel of the DOA's Extension Branch.

The ARPT would be responsible for introducing a "bottom up" approach into the process of establishing agricultural research priorities in Zambia. This approach, sometimes called "adaptive research," begins by identifying the problems and constraints of farmers in a geographical region, bringing these problems to commodity research scientists, identifying opportunities for the improvement of existing farming systems, testing new technology at the farm level, and gradually improving the farmer's system. Also, the ARPT looks at the small farm from "a total system point of view instead of by a single crop" (Yohe, et al., 1985:17).

The ARPT system of adaptive research or FSR/E basically follows the four stage model of on-farm research that CIMMYT had earlier introduced to Zambia: (1) Diagnostic stage: analysis of farmer needs and farming system potential and constraints; (2) Design stage: identification of possible improved technologies; (3) Testing stage: evaluation of promising technologies under farmers' conditions; and (4) Extension stage: dissemination and general application.

While the main functions of the ARPT would initially be limited to research and extension, the PP anticipated the ARPT would eventually "engage in a broader set of functions. These include influencing the content of agricultural training and extension information programs and influencing the operation of agricultural support services in favor of small farmers" (PP, p. 13). However, the PP "stressed that adaptive research by the ARPT will complement and interact with commodity research by the CRTs. The ARPT will influence the choice of CRT research priorities and the CRTs will generate improved technologies for testing by the ARPT" (PP, p. 13).

Design - How was this basic technical idea translated into a project?

The project design provided a mix of inputs, including TA, long-term academic training, short-term training, procurement of laboratory and field commodities, and some operational costs support on a sliding scale. Inputs were to be combined in a two-pronged strategy: (1) to strengthen national-level Commodity Research Teams (CRTs) through the participation of TA personnel with applied research expertise in plant breeding (maize and soybean), agronomy (sunflower), and soil microbiology; and (2) to strengthen the Central Province Adaptive Research Planing Team (CP/ARPT) through the participation of TA personnel with expertise in FSR/E.

Thus, the TA team was to include both personnel working with the CRTs and personnel working with the ARPTs. The TA team working with the counterpart ARPT was to include a Farming Systems Agronomist, a Farming Systems Economist, and a Research Extension Liaison Officer (RELO). The agronomist and economist were to be based in the MAWD's Research Branch, while the RELO was to be based in the Ministry's Extension Branch, to facilitate a close working relationship with the Provincial Extension Training Officer. The three-member ARPT would be located at the Kabwe Regional Research Station. The other four members of the TA team were to be assigned to work with the Research Branch's CRTs.

The second evaluation of the ZAMARE project noted that the project was "unique among farming systems projects" in that the project design called for the National Research Branch to be linked with the National Extension Branch" through the RELO and the ARPTs (Yohe, et al., 1985: p. 2 of Africa Bureau Executive Summary). While recognizing the importance of linking research and extension, project funding for extension was limited to the provision of motorcycles to extension supervisors and in-service training of extension workers in the diagnostic, design, testing, and dissemination stages of the ARPT process.

That the project design did not provide TA personnel to extension was noted by the second evaluation as jeopardizing the institutionalization of effective extension participation in and support of the ARPT model (Yohe, et al., 1985). On the other hand, the first evaluation, in assessing the project's design, commented that: "Few research development projects in the A.I.D. are as well designed (Benoit, et al., 1983:5)."

Implementation - How was the project managed by the host-country implementing agency, the TA team, and USAID?

The CP/ARPT was the first ARPT in Zambia to become fully operational. The origin of FSR/E in Zambia may be traced to 1978, when CIMMYT's East African Economics Program conducted a series of low-cost farm surveys in the Serenje District of CP. Based on these surveys, CIMMYT "zoned" the CP into eight recommendation domains (RDs): one "commercial" RD, one "emergent" RD, and six "traditional" RDs (TRDs). The TRDs, with an estimated 46,000 farm families, were subsequently identified in the ZAMARE PP as the project's primary target group. Following the "zoning" of the CP, the Zambians established on-farm trials in the Serenje District during the 1981-82 cropping season.

By October 1982, the TA personnel comprising the ARPT had all arrived in country. During the 1982-83 cropping season, the ARPT initiated survey work in Mkushi District and on-farm trials in both Serenje and Mkushi Districts. By 1985, the ARPT's program had expanded to include on-farm trials spread over the three largest TRDs in the CP. The typical approach for selecting farmers to participate in ARPT-sponsored on-farm trials was to hold farmers meetings at which farmers are asked to host trials. As the evaluation noted, farmers

> outside of the target group may be rejected, but this does not always happen as the reliability and receptiveness of more progressive farmers is seen as a valuable attribute. The main criterion of selection is therefore willingness to host trials, and representativeness of the target group is secondary (Sutherland and Warren, et al., 1985:16-17).

But as the evaluation also noted, this approach risks selecting farmers who are not very representative of the target group and, thereby reducing the program's social impact because target group farmers are not integrated into the on-farm research process.

With the on-farm trials being "researcher managed/researcher implemented" trials, farmers were not being "closely involved with the design or running of the trials" (Sutherland and Warren, 1985:14). Further, while there was nothing about these trials that would preclude more farmer involvement, the trials in many cases had been sufficiently simple to enable "the kind of collaboration between farmer and researcher which FSR is designed to promote" (Sutherland and Warren, et al., 1985:14).

Greater interaction between the ARPT and farmers may have been precluded by expatriates not being fluent in the farmers' language (Chibemba). Also, the large number of on-farm trials contributed to a reliance on Zambian trial assistants and a reduction in researcher-farmer contact. This suggested the need to intensify the training of trial assistants in how to more fully involve farmers and extension workers in on-farm research.

The Commodity and Specialist Research Teams (CSRTs) worked closely with the ARPT in CP and other provincial ARPTs that became operational during ZAMARE, in designing and implementing on-station verification and on-farm trials. This was encouraging because inadequate communication between ARPTs and CSRTs had been recognized as a potential problem since the time that the ARPTs began to function in 1981. The evaluation noted that:

> The re-organisation of the research branch included...the mandate for ARPTs, as the spokesmen of the small farmers, ...to determine about two-thirds of the content of CSRT research programs... Sutherland and Warren, 1985:22). [3]

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[3] Sutherland and Warren (1985:22-23) point out that this quota was advanced when agricultural research was largely aimed at developing technology suited primarily to commercial farmers and high levels of management. Indeed, many CRT programs were

> long standing breeding and varietal selection programs under the direction of experienced expatriates who had spent a long time in Zambia. These breeders sometimes lacked a farming systems perspective, and in some instances were skeptical about the value of breeding for the low management and late planting conditions which prevail in most of Zambia's small-scale farming systems; the attitude being to change the small farmer rather than adjust breeding priorities (Sutherland and Warren, 1985:23).

Faced by the potential of inadequate communication between an ARPT and the CSRTs, the ARPT national coordinator established a series of mechanisms to facilitate a two-way flow of information between an ARPT and the CSRT. These mechanisms included:

-- Involving CSRT scientists in the exploratory surveys, this serving to guide the development of the verification survey questionnaire and to apprise ARPT members of potentially relevant technological solutions that already exist.

-- Involving CSRT scientists in Pre-Research Committee Meetings in which ARPT members present the problems that arose during the surveys or trials, and proposals for technical component research and on-farm trials. Following approval of an ARPT's proposed adaptive research program by the Research Committee Meeting, the CSRT scientists would comment on the details of each trial.

-- Providing CSRT scientists with agronomic data sheets (uninterpreted but quantitative summaries of ARPT survey data on agronomic practices and problems in farmers' fields.

-- Formulating crop research strategies based on the quantified data collected on farmer systems and CSRT scientists' knowledge of what research is feasible.

-- Using standard formats for the ARPT to present identified problems to CSRT scientists and for commodity scientists to prepare crop profiles on new varieties for ARPTs, and a project outline format for adaptive research trials.

These various mechanisms facilitated the ARPTs in providing information on farmers' problems requiring component research, and feedback on research conducted under farmer conditions. The CSRTs, in turn, provided information on possible technological solutions available for on-farm experimentation (Sutherland and Warren, 1985:56-57).

Despite these mechanism, the evaluation found that SSPs and extension workers had

> not been closely involved in the identification of research priorities and the design of trials for farmers' fields. ...closer involvement of SSPs should be a primary objective, especially as the on-farm research becomes less exploratory, and more verification-oriented.... At present farmers are only involved at meetings used to recruit volunteers and in field days. The discussion of existing research priorities should also be attempted at meetings with farmers.... Similar meetings could be used to discuss the design of on-farm trials (Sutherland and Warren, et al., 1985:15).

The ARPT trial assistants involved with on-farm trials were

extension workers seconded for two years from the extension service. The intent of this arrangement was to allow for a rotation of extension workers through the ARPT process "to help inject a FSR perspective into extension" (Sutherland and Warren, et al., 1985:15). Recognizing that some extension workers may not be suitable for training as trial assistants and that others might require more supervision, the evaluation favored a 3-4 year rotation and recommended that steps be taken to involve extension workers more in on-farm adaptive research.

The CP/ARPT was the first ARPT to have a RELO. The RELO seeks to instill "the FSR component of research into extension, so that...on-farm research can be...transformed into...recommendations which local extension workers can communicate...to farmers" (Sutherland and Warren, et al., 1985:17). At the provincial level, the RELO actively supported the ARPT program by establishing a training system in FSR/E, whereby provincial level officers would train block supervisors and district level staff who, in turn, would train field extension workers.

At the TRD level, the RELO actively collaborated with ARPT staff in organizing field days for research, extension, and farmers. However, the evaluation noted that the outcome of these field days had not been closely monitored.

> To date ARPT field days have functioned effectively as public relations and education exercises, but priority has not been placed on obtaining feedback from farmers or extension and research officers visiting the trials. Thus the impact of farmers and extension staff on CP/ARPT trial programs through field days has been minimal...(Sutherland and Warren, et al., 1985:20).

The RELO was also active at the TRD level in seeking to involve extension workers in farmer surveys, on-farm research trials, and farm-level demonstrations of technology deriving from the ARPT program and other sources.

The evaluation team identified two areas that needed to be strengthened in the FSR/E process. First, the team saw a need for extension subject matter specialists (SMSs) to be integrated in the provincial ARPT and to have leadership responsibility for programming and training in their subject in the province (Yohe, et al., 1985: p. 7 of Executive Summary). Second, the team identified a need to take extension programs

> to farmers...in the context of the total range of decisions the farm family faces. Thus more of a complete farm management extension training and extension program needs to be implemented to strengthen the ARPT concept (Yohe, et al., 1985: pp. 7-8 of Executive Summary).

Two issues appear to underlie these needs: (1) that ZAMARE did not provide inputs (e.g., expatriate TA to extension and long-term training of extension personnel to M.S. level) to develop extension as an institution; and (2) that the ARPT's adaptive research methodology (on-farm trials, etc.) placed relatively little emphasis on approaching the farm in a systematic or holistic manner.

A final point merits comment concerning implementation of the ZAMARE project. USAID/Zambia and the Mission's Project Support Unit (PSU) provided a range of incountry backstopping services to the contractor, with the cost of these services being covered by funds retained by the Mission from the project's budget. The PSU, in collaboration with the contractor, was instrumental in ensuring that equipment and supplies were available to the TA team upon their arrival. Further, early action by the Mission and the MAWD was instrumental in implementing the participant training program, with the result that trained Zambians were scheduled to begin returning to their posts as early as January 1984. "Most AID development assistance projects don't see equipment and supply purchases until the second to fourth year of a project and often trainees don't return until after a project has terminated" (Yohe, et al., 1985:2).

If the ZAMARE project can be judged as one of the more successful A.I.D.projects, this may owe in part to the excellent logistical support USAID/Zambia afforded the TA team. This included not only the support services provided by the PSU but also two project-funded Zambian staff persons who assisted the TA team leader in handling the myriad of administrative details involved in implementing a project, thereby enabling the team leader to focus a greater percentage of his time on providing leadership for project implementation.

<u>Evaluation</u> - How was the project's performance measured or assessed?

Overall, the second evaluation found that ZAMARE had "been so successful that logistic problems...occurred because of increased activity and involvement over what the design paper envisioned" (Yohe, et al., 1985: p. 3 of Executive Summary). In short, the "ARPT concept has been very successful" (Yohe, et al., 1985: pp. 3-4 of Executive Summary).

Areas in which the evaluation cited ZAMARE as having contributed to the development of improved technology included the development of two early-maturing maize varieties with high yield potential and disease tolerance, development and release of a free-nodulating soybean variety, and introduction of two more efficient strains of a local Rhizobium inoculum for soybean.

The evaluation found that the adoption rate of "the new technologies developed is evident through the amount of new seed of maize, sunflower and soybeans that are being utilized by small-scale producers" (Yohe, et al., 1985: p. 2 of Africa Bureau Executive Summary).

The RELO concept had proven "so successful" that the team recommended

> design adjustment to allow extension subject matter specialists (SMS) to work more closely and collaboratively with the ARPT Agronomist, Agricultural economist, and the RELO. This is the next step toward integrating research and extension. The SMSs would carry approximately a half time research appointment and a half time extension appointment thus making a permanent bridge between extension and research (Yohe, et al., 1985: p. 4 of Executive Summary).

The ARPT had also been effective in facilitating improved integration of research outputs with an agricultural production input supply firm, with the project providing

> some of the basic cereal and oilseed to the only seed supplier...in Zambia. This company, ZAMSEED, ...[has] every incentive to work with the project, as their lifeline is new varieties...released by the MAWD research branch. ZAMSEED makes direct and in-kind contributions to the project/program and cooperates in the production, certification, supervision and pricing of seed for national distribution (Yohe, et al., 1985: p. 3 of Africa Bureau Executive Summary).

The project also had substantial impact in knowledge transfer and information flow

> through the Newsletter; by training courses at national, provincial, district and camp levels; by demonstrations at [Farmer Training Centers] and the Kabwe Regional Research Station; by district field days for both [Extension Workers] and SSPs. The pay-off in terms of an improved and energized research-extension system capable of operating in a two-way dialogue with SSPs, and the potential high adoption and diffusion rates of improved cropping methodologies and practices by SSPs should become evident within another year or two (Sutherland and Warren, 1985:41).

Institutionalization - How did the project provide for the implementing agency to develop a sustainable capability to continue to perform the types of activities supported by the project?

A key contribution of ZAMARE to institutionalizing improved research and extension capacity was the support the project provided for long- and short-term training of Zambians participants. The PP had planned for 34 participants; all were expected to have completed their training during the LOP.

A preoccupation during the early stages of institutionalizing FSR within the Research Branch was to avoid threatening or arousing any animosity on the part of the scientists with the Commodity and Specialist Research Teams (CSRTs). Further, given the considerable attention and TA and training support being given to ARPT by the GRZ and outside agencies

> there has been a danger that technical component research would be overlooked. This is due in part to the tendency to see farming systems research as a panacea. However, it has become very obvious to those with ARPT that it is not, and that whilst it does have several unique and important features it must be seen as an integral part of the Research Branch complementing the work of the CSRTs. For, when no technical component research has been undertaken...., then ARPT is not able to test any possible technological situations (Sutherland and Warren, 1985:56).

Concluding their evaluation of ZAMARE's socio-economic component, Sutherland and Warren (1985:40-41) state:

> It is clear that there is a growing understanding of the principles and philosophies upon which FSR and ARPTs are based. Members of both ARPTs and CSRTs are beginning to develop the avenues for improved collaboration. Sensitivity by MAWD personnel down to the camp level has improved regarding the important role of the SSP in the ARPT process. One small-scale cooperating farmer in Serenje even designed his own research trial intercropping maize and sunflower in rows - and determined that the mix was not one he would recommend.

A further indicator of the institutionalization of FSR/E in Zambia is provided by the fact that Adaptive Research Planning Teams (ARPTs) now exist in six of Zambia's nine provinces. While each ARPT is supported by a separate donor, all operate under a National Coordinator who reports to the Chief Agricultural Research Officer.

The progress be ZAMARE by the time of the second evaluation led the evaluation team to recommend that USAID/Zambia extend ZAMARE into a Phase 2, with a modification in the project design to include provision of a mix of TA to extension and long-term training of 25-35 SMSs to the M.S. level. The evaluation also recommended that a sociologist be added to the CP/ARPT.

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Annex A. Project Description Sheet.

This Project Description Sheet lists the core, operational, and generic constraints identified in this project, per the following codes: core (C), operational (O), and generic (G). A positive (+) sign after a constraint indicates that the project was effectively coping with the identified constraint.[4]

Core Constraints (C)

C.1 Farmer Orientation
C.2 Farmer Participation
C.3 Locational Specificity of Technical and Human Factors
C.4 Problem-Solving Approach
C.5 Systems Orientation
C.6 Interdisciplinary Approach
C.7 Complementarity with Commodity and Discipline Research
C.8 Technology Testing in On-Farm Trials
C.9 Feedback to Shape:
  a. Agricultural Research Priorities
  b. Agricultural Policies

Operational Constraints (O)

O.1 Stakeholder Understanding of FSR/E
O.2 Agricultural Research Policy/Strategy Defining Role of FSR/E
O.3 Long-Term Commitment of Resources
O.4 Existing Research Capability and Shelf Technology
O.5 Consensus on FSR/E Methodology
O.6 Capability to Process Farming Systems Data
O.7 Consensus on Criteria for Evaluating FSR/E
O.8 Links with Extension
O.9 Links with Agri-Support Services
O.10 Links with Farmer Organizations

Generic Constraints (G)

G.1 Project Management Structure
G.2 Government Funding to Meet Recurrent Costs
G.3 Staffing with Trained Manpower
G.4 Management of Training
G.5 Management of Technical Assistance
G.6 Factors Beyond a Project's Control

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[4]An analysis of these constraints in 12 FSR/E projects appears in A Review of A.I.D. Experience with Farming Systems Research and Extension Projects, **A.I.D. Evaluation Special Study** (forthcoming), available from A.I.D.'s Document and Information Handling Facility (per instructions on last page of this report).

Zambia/ZAMARE - Agricultural Development Research & Extension Project (611-0201)

Initial Authorization: 1980 (for 5 years)

Goal: "to assist the GRZ in improving the welfare of small farmers and increasing national food production through the development and adaptation of relevant technology."

Purpose: "to help the GRZ strengthen the agricultural research capacity of the Ministry of Agriculture and Water Development (MAWD) and to increase the effectiveness of the extension service in transferring relevant agricultural technology with special emphasis on small farmers."

Outputs:

1. Strengthening of the MAWD Commodity Research Teams on oilseeds and cereal grains;
2. Effective operation of MAWD's first Adaptive Research Planning Team (ARPT) in Central Province;
3. Enhancement of the capacity of the extension service to diffuse usable agricultural technology to small farmers through improved research/extension linkages and communication; and
4. Upgrading of the professional and technical skills in agricultural research and extension within MAWD through selected academic and practical training in Zambia, the U.S., in other African countries, and at international institutions.

Implementing Agency: Research Branch, Department of Agriculture, Ministry of Agriculture and Water Development.

TA Contractor: University of Illinois at Champaign-Urbana as lead university, Southern Illinois University, and the University of Maryland Eastern Shore.

Evaluations: Two -- in 1983 (Benoit, et al., 1983); and in early 1985 (Yohe, et al., 1985; and Sutherland and Warren, 1985).

Constraints: C.2, C.7, C.9 (+), O.1, O.2 (+), O.8, O.9 (+), G.4 (+), G.5 (+).

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