



CDIE WORKING PAPER NO. 112

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

Case Study No. 6

Tanzania Farming Systems Research Project (621-0156)¹

by

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¹This 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:

Botswana Agricultural Technology Improvement (633-0221)
Gambia Mixed Farming and Resource Management (635-0203)
Lesotho Farming Systems Research (632-0065)
Malawi Agricultural Research (612-0202)
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Tanzania Farming Systems Research (621-0156)
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Tanzania Farming Systems Research Project (621-0156)

The Tanzania Farming Systems Research Project (TFSRP) was authorized, as a three year project, August 9, 1982, for \$8,300,000. The Project Grant Agreement with the Government of Tanzania (GOT) was signed in September 1982. Technical assistance (TA) to the project was provided by the Consortium for International Development (CID), with Oregon State University as lead university. The original TA contract, signed in April 1983, provided for ten TA positions; the amended contract of September 1985, provided for only three positions.

The original TA team, consisting of specialists in agricultural research planning/management, agronomy, and maize improvement, arrived in country in the fall of 1983. A sorghum/millet breeder joined the team in February 1984. However, effective July 1, 1984, the GOT disallowed the services of the maize improvement specialist and the sorghum/millet breeder. While both individuals had departed Tanzania by late fall, 1984, the TA team's size remained at three because an agricultural economist had joined the team on July 3, 1984.

In early 1983, following Tanzania's default on loan interest payments, the United States Government applied the Brooke Amendment. This resulted in a restriction on future funding to USAID/Tanzania projects and interrupted orderly implementation of the TFSRP (e.g., the project's basic food crops research component was eliminated). While the project's farming systems (FS) component was retained, the districts in which field activities were to be conducted was reduced from 15 to 3.

TA was also reduced. The original contract provided for 306 long-term and 30 short-term person months of TA. The amended contract of September 1985 reduced these figures to 150 and 19, respectively. By the project's end, actual TA assistance (3.96 person years) was less than half (49.5%) of originally planned 8.0 person years of technical assistance (Faught, 1986:11). TA was provided through August 1986.

TFSRP was evaluated two times. The first evaluation was conducted in 1986 (Jackson and Osburn, 1986). Subsequently, a Project Completion Report (PCR) (Faught, 1986) was prepared. This case study is based on these evaluations as well the Project Workplan (CID, 1983) for Years 1 and 2.

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

TFSRP sought "to build...capacity within the Tanzania Agricultural Research Organization (TARO) to produce and extend ...research more relevant to small farmers" (CID, 1983:1).

This was to be achieved by introducing a FS approach "to redirect...priorities toward constraints...readily amenable to correction and to improve...recommendations for increasing agricultural production" (CID, 1983:1-2). The project workplan (cited in Jackson and Osburn, 1986:4) stated:

The FSR approach involves assisting on-going agricultural research and extension activities to redirect...technology development, testing, and dissemination...toward the needs of farmers. It views the farm and farm family as a total entity; seeks to understand the...interactions of the operation of the farm as a system; and includes the farmer directly in the agricultural technology development process.

A second key idea underlying the project was that of improving management of the national agricultural research system (TARO).

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

Six objectives were established for TFSRP, as follows (CID, 1983:2-3):

- To develop and institutionalize a national research organization (TARO) capable of sustaining and extending adaptive (on-farm) food crop research nationally.
- To develop and test a methodology for using the FS approach as a research and information dissemination strategy.
- To integrate the FSR approach with the ongoing food crop research program.
- To develop and test improved technical recommendations for increasing food crop production by smallholders.
- To integrate the activities of the agricultural research organization with the activities of other GOT institutions serving the agricultural sector at local levels to improve the transmission of research results to small farmers.

- To develop the skills of Tanzanian researchers in basic (on-station) and adaptive (on-farm) food crop research.

TFSRP was to be implemented as a pilot project by the TARO in three agro-ecological zones, with initial activities in a small number of administrative districts in two zones during the project's first year, and expanded to other districts and a third zone in the second and subsequent years. Activities such as diagnostic surveys and on-farm trials were to be carried out by TARO personnel assigned to zonal and regional field teams.

When TFSRP was initiated, various technologies were being tested at crop-specific Agricultural Research Institutes (ARIs), with three to five years of research already completed on component inputs (including varieties) and cultural practices for basic food crops (maize, sorghum/millet, and legumes).

The workplan (CID, 1983:26-27) developed by the contractor indicated that:

The two Senior FSR Specialists...will supervise and manage the FSR Project in Tanzania, and, by the end of the contract, will have developed FSR institutional capacity in TARO from national to local levels such that the program will continue after contract personnel have departed. . . . The Senior FSR Specialists will be assigned Tanzanian counterparts for each agro-ecological zone within which the project operates. They will operate from the Planning/Evaluation Department of TARO Headquarters, with frequent trips to the assigned agro-ecological zones. They will serve as advisors to the ARI Directors (zonal coordinators) and the Commodity Coordinators on food crop research activities and coordinate the district FSR research/extension teams. They will be responsible for establishing working relationships with the various zonal, regional, and district level agricultural extension staff and supervise the work of the FSR teams in the regions and districts.

The senior FSR team will work closely with the regional and district agriculture extension staff to find representative sites to conduct village trials and to identify farmers through village leaders to conduct on-farm trials. To run on-farm trials, FSR teams should collaborate with the Regional Agricultural Development Officer (RADO) and the District Agricultural Development Officer (DADO) to select the villages. The FSR Team, along with the DADO designated Farming Systems Officer, discusses the matter with the Village Council...to select the farm sites and the farmers.

The FSR Team will assist Crop Coordinators in setting up village [on-farm] research trials...to determine if the new technology is relevant to farmer needs. The CID Crop Improvement specialists as members of the FSR zonal teams, will assist the...Senior FSR Team in identifying and collecting all previous diagnostic field surveys conducted in the specified zone and in coordinating all future diagnostic surveys. The information obtained from the farmers will be analyzed by the...Senior FSR Team and a work plan for the next planting season developed for both food crop research and the farming systems program[s].

Training, another component of the project's workplan, was to be provided by the contractor and by the AID-funded CIMMYT Farming Systems Research Project based in Nairobi, Kenya.

It is of interest to note that the project workplan stated that the "underlying philosophy...was to surpass the existing state of the art for FSR field operation" (cited in Jackson and Osburn, 1986:4). Further, the project's FS approach embraced:

explicit economic performance criteria to (1) measure the economic performance of technologies...used by farmers... [and]...establish benchmarks against which introduced technologies will be evaluated, (2) establish research priorities which meet farmer/researcher choice criteria including technical feasibility, cost effectiveness and time sensitivity, (3) provide continuous screening of introduced technology...[against] technical/economic criteria to eliminate technologies with little promise and modify promising technology to enhance potential for adoption and (4) measure actual level of economic gain when adoption occur[s] (Jackson and Osburn, 1986:4).

The workplan also stated that, based on the existing FSR/E literature, "it appears that the Tanzania Project is the first FSR project to embrace the development and use of explicit economic performance criteria." However, the workplan also noted that the project would "seek to identify and evaluate non-economic factors that influence farmers decisions."

Asked whether the project's design had in any way been deficient or inappropriate, a former TA team member noted that the project's design had entirely divorced TARO, physically and conceptually, from the research organizations it represented. "Institutionalization should have begun within the research center at Ilonga, NOT in this hypothetical organization that was ostensibly created to unify all the research in the country" (A. Cunard, personal communication).

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

While responsibility for implementing TFSRP was placed in TARO, the staff of the TA team generally operated throughout the project without specifically assigned counterparts. There were long delays in assigning Tanzanian staff to the project and to field positions; and the actual number of Tanzanian staff eventually assigned to the project fell short of project needs, although two zonal teams were functional at the close of the project. The limited project staffing was complemented by the collaboration of at least seven TARO scientists working on joint experiments and eight extension people who assisted in conducting field trials.

Project implementation was also plagued by inadequate leadership in TARO. A former TA team member recalled that the Director-General of TARO often was not available to the project, while the Tanzanian Project Director had other demands competing for his time and attention (A. Cunard, personal communication). Further, TFSRP was "not designed with the inputs of Tanzanian researchers and this was one of the major reasons why it was so difficult at first to obtain their collaboration" (A. Cunard, personal communication). For example,

the Extension Division authorities were never consulted or had any inputs in the project design. Nobody ever thought to ask these people first what they thought about FSR.... Surely it is not difficult to understand why there was so little cooperation from Extension! (A. Cunard, personal communication).

Although the evaluation team found that the project's diagnosis stage had been adequately designed, the team noted that the project had not investigated "all...the resource allocation decisions that farmers must make" nor addressed "the functioning of the total system...in an explicit systematic fashion" (Jackson and Osburn, 1986:5). The team recommended that the project conduct earlier-proposed market analysis and intra-household studies "to provide...the missing links regarding the total system" (Jackson and Osburn, 1986:5).

Another problem acted as a constraint on moving ahead with the activities specified in the project design:

...almost all commodity researchers are also part-time farmers. ...one would expect them to be readily cognizant of the constraints that farmers in the area have, and in turn, that hands-on experience would influence their commodity research activities. Apparently this is not the case in that the commodity researchers rarely, if at all, visited FSR/E...trials. In addition the constraints that

commodity researchers had with their own farm operations were significantly different than other farmers. ...the commodity researchers lacked the total system perspective and were not fully aware that other farmer[s'] constraints were different (Jackson and Osburn, 1986:7).

Further, the staffing of field positions with inexperienced professionals (recent college graduates) led to problems in implementing on-farm trials (e.g., the problem of getting appropriate bean density levels among treatments and an adequate control in terms of farmer traditional planting density levels).

There were also cases where extension personnel established on-farm trials independently of those established by the project's FSR team. This was problematic where extension had not yet developed adequate FSR capability, and pointed to the importance of integrating the FSR team and extension personnel to ensure adequate hands-on, learn-by-doing, on-the-job training, supplemented as appropriate by formal short-term training activities.

The project was particularly effective in documenting project activities and outcomes. More than 100 documents were produced, many authored or co-authored by Tanzanians. These publications provided support material for short-course training activities, and facilitated exchange of information within country and among FSR programs across countries.

It may be of interest to note the background that led to having the Tanzanians play an active role in the co-authoring of project reports. This, according to a former member of the TA team, grew out of Tanzania's brand of socialism and its ramifications for the project. For example, no agricultural reports written after 1976 were available in the TARO documentation center, "the reason given being that the prominence and prestige gained by a researcher in publishing a report was against the socialist idea of equality for all. It made the others who did not write seem inadequate" (A. Cunard, personal communication). Consequently, the TA team encouraged the junior members of the TARO staff attached to the project to co-author the Reconnaissance Survey Reports that were intended to provide commodity researchers at Ilonga with feedback on farmers' problems. The Chief of Party was then successful in getting these reports published.

Evaluation - How was the project's performance measured or assessed?

The FSR team's diagnostic surveys had identified February as the month in which there was a food shortage in Kilosa district of Ilonga. The FSR team designed a set of on-farm trials to test potential technology solutions to this problem. One technology was an early-maturing maize variety known as Kito:

Appropriate trials were designed to test adoption feasibility for the traditional [farming] systems. Early on-farm trial results were whopping successes. Almost all farmers were pleased. Seed is in great demand and is reflected in scarce seed supplies (Jackson and Osburn, 1986:9).

The "Kito" story illustrates FSR's role in identifying problems faced by farmers and designing appropriate on-farm trials to test potential solutions. Kito was a shelf technology developed at the Ilonga research station. While the variety had not proven popular with farmers, FSR discovered and assessed its adaptability to farmer systems (Jackson and Osburn, 1986:10).

The station's major emphasis had been developing varieties for production during the Masika (long rains) season. While the Kito reduced the risk of crop failure from drought when planted in the Masika season, Kito produced lower yields than full season varieties when planted in a normal season. However, when planted in the Vuli (short) season, Kito yielded as well as traditional long season varieties and provided a harvest several weeks earlier than the traditional varieties. Also, it was found that:

subsequent Masika season crops of maize or cotton following Kito planted in the Vuli season yielded 20 to 30 percent more than they did if planted after traditional full season varieties. Over the two year period that the trials were run approximately 50 farmers per season grew Kito and in the 1985/86 season Kito seed were sold to an additional 500 farmers (Faught, 1986:4).

Thus, in addressing varietal development on the basis of maximum yield, the narrower commodity focus saw Kito as having little or no value. But this analysis was incorrect and shed light on the consequence for researchers and extensionists of not adopting a total system perspective (Jackson and Osburn, 1986:10). The "Kito" story brings home the need to look at the total system rather than a component, and highlights the necessity of an adequate technology generating or research support system.

Another positive contribution of the project's approach to FSR was evidenced in the research on the maize/cotton relay association. The cotton researchers had recommended, and the GOT had legislated, that farmers should not intercrop maize and cotton, because of the risk of destruction of the cotton by *Heliopsis* which used the maize as an alternative host. However, some farmers were successfully intercropping maize with cotton. The project arranged for the cotton researchers to visit the fields of these farmers. "The end result was that the very next season there was a trial laid out on the station to test this relay cropping technique" (A. Cunard, personal communication).

Comparing the project's actual accomplishments relative to those initially planned, the Project Completion Report (PCR) notes the following end of project status (Faught, 1986:15):

- Instead of 18,000 farmers in 15 districts utilizing new technology, some 500 farmers in 3 districts are utilizing at least one technology package.
- The methodology for using FSR as a technology development and dissemination strategy has been tested in two rather than three agro-ecological zone.
- One team is staffed and trained to teach colleagues FSR methods, and two teams are partially staffed and partially trained. However, only a small fraction of TARO's scientists are agricultural economists and none are social scientists.
- TARO will most likely continue to sustain a food crop/adaptive research program on a national basis. The quality and relevance of the research is more questionable.

The purpose of the TFSRP was to introduce a FS approach within TARO as a means of increasing the relevance to farmers of that organization's food crop research program. The PCR concluded that the project had "certainly...been successful in introducing the farming systems approach, but it was on too limited a scale and conducted for too short a time to have had any significant impact on improving the research program" (Faught, 1986:15). However, as a former TA team member added, one

should also take into account some of the proposals that were made and possibly acted upon by the research staff at Ilonga in order to give a proper evaluation of the success of the project. Most of these are described in the "End of Tour Report".... . . . If only the...project had been designed better and had lasted long enough, many of these useful innovations would have been absorbed into the prevailing farming system (A. Cunard, personal communication;

and Cunard, 1985).

Finally, in evaluating the success of the project, one should not forget that the Tanzanian farmer's ability to adopt improved technology was constrained by a range of factors beyond the control of the TFSRP. These problems included

a) the rigidly controlled Government market for cereals, which gave rise to a purchase and payment system that deprived the farmer of any incentive to produce more than absolutely necessary, b) the UJAMA "villagization" scheme that removed farmers from their fertile fields and gave them infertile ones, and c) the inability of the Government to make good on many of its promises to villagers in providing them with services (A. Cunard, personal communication).

Since most of these problems stemmed from the country's political situation, an argument could be made that the "primary thing"

that should be done before even thinking of writing up an FSR project proposal should be to make an evaluation of the political and social conditions in the country. I don't believe this was done or being done presently by USAID. The result was pure frustration for team members and even for the participating Tanzanians themselves (A. Cunard, personal communication).

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?

The FS approach requires interaction between researchers and farmers; however, it also implies limitations on the extent to which a relatively small number of researchers can meaningfully interact with the relatively large number of farmers. Extension potentially can play a major role in overcoming these limitations and facilitating interaction between researchers and farmers. Indeed, the evaluation team noted that extension's role

could become more crucial should FSR/E funds and personnel be reduced. In fact, FSR/E survival could be determined by the extent to which extension participates and is integrated into the FSR/E activities (Jackson and Osburn, 1986:8).

While the evaluation team recognized the FSR/E approach as "a source of knowledge and techniques that could revitalize... extension," this currently "is not the case because extension personnel did not articulate such benefits associated with the FSR/E approach" (Jackson and Osburn, 1986:7).

These conclusions suggest that TFSRP encountered difficulties in defining and/or developing extension's involvement in the project. Indeed, the project implementation plan was based on the assumption that:

The Directorate of Extension and Technical Services (DETS) will help insure that the FSR Project is properly integrated with the extension workers in the field. DETS will insure that the RADOs and DADOs are adequately briefed and become actively involved with project implementation. The DETS will also provide one person at the District level to be a permanent member of the district FSR Team. Also, in selected villages within each district, the village agriculture extension worker will help conduct surveys, carry out field trials and demonstrations and do other work to implement the project (Jackson and Osburn, 1986:3).

However, when compared with the project's success in establishing a close working relationship with TARO commodity researchers, the project was less successful in establishing "close ties with extension workers...due at least partially to differences in level and type of training" (Faught, 1986:4).

The project's relatively greater success in working with TARO researchers owes in large part to the FSR/E training that the project provided this group. Opportunities for training included on-the-job training; national FSR/E training seminars; long-term, discipline-oriented, academic training; and short courses and workshops supplementing long-term academic training. Some trainees also participated in the Farming Systems Research and Extension Symposium at Kansas State University.

Training of personnel in FSR/E is a necessary condition for institutionalizing a FS approach in a national agricultural research and extension system. However, training alone is not a sufficient condition. Trained personnel must be assigned to positions where they can apply their training. In this regard, the PCR noted that there had been an expectation

that a substantial number of scientists and technicians trained under the Tanzania Agricultural Research Project would be posted to the Farming Systems Research Project but these postings never occurred. Recruitment of alternative personnel was slow and, in fact, never completed (Faught, 1986:2).

Further, commenting on the ten participants who had been sent for advanced degree training, the PCR stated:

This group, along with the group that has worked on the FSR project in-country for the past two years would constitute an excellent cadre for continuation of the FSR program. However, only four of the ten advance degree trainees were employed on the FSR project prior to starting their graduate program. There is no assurance that the six not previously employed in the FSR unit will be posted there on their return. In fact, there is no assurance that even the four previously employed in the FSR unit will be retained there (Faught, 1986:2).

Thus, while TFSRP was notably successful in establishing a good relationship with farmers in the areas where the project functioned, the PCR concluded that the project "failed to establish a firm organizational niche within the Government structure" (Faught, 1986:4). The PCR noted the following as potentially contributing to this failure:

- It was probably unrealistic to expect to achieve institutionalization within the limited time frame and restricted geographic area in which the project was required to operate.
- With a strained budgetary position, the Government was unable or unwilling to commit continuing recurrent budget support for a new organizational unit.
- The continued weakness of TARO, to which the FSR unit was attached, probably discouraged institutionalization.

Another potentially influencing factor was likely the sharp reduction experienced in the project's technical assistance component.

The PCR indicates that the project was also generally successful in establishing and strengthening ties with other agricultural organizations. Less successful were the project's efforts to improve TARO management capability. In this respect, the PCR noted that:

It seems probable that the experience of going through planning, budgeting, and monitoring and other exercises involved in a research program jointly with trained and experienced researchers...must have improved the skills and capability of the TARO staff to carry out these activities in the future. . . . Any improvement in TARO management that did occur may have been wiped out with the dismissal of the TARO Director and other top staff shortly before USAID/CID participation terminated (Faught, 1986:5).

At a more general level, the project may also have had an impact at the policy level. As the PCR notes, the Government's position relative to the FSR approach is set forth in the section on agricultural research in The Agricultural Policy of Tanzania (Ministry of Agriculture, March 31, 1983). This policy states that a comprehensive research program would be developed which would "be linked with the extension program as closely as possible" so that "the peasant's experience may be incorporated in research" and "research will be given a farm-centered, problem-solving approach" (cited in Faught, 1986:4). However, it is not clear whether this policy was promulgated as a sincere "declaration of support" for FSR/E or simply to meet a requirement or condition precedent for AID funding of TFSRP.

Overall, as the PCR noted:

The major lesson that should have been learned, or perhaps more appropriately re-learned, is that development of a research capability and the institutionalization of such capability is a very long term activity. Resources that are used for short-term support of such activities are generally, if not always, wasted (Faught, 1986:16).

In the last analysis, one may ask to what extent and in what ways TFSRP was successful in institutionalizing a more effective approach to agricultural research and extension in Tanzania? A former TA team member responded to this question as follows:

I don't think I would be able to give a valid answer to this question. I left the country in 1985...and have not had any news since about what has happened to the FSR unit attached to the research station at Ilonga. I was more concerned with getting the researchers at Ilonga to...orient their research...programs with the needs of farmers. If this kind of involvement becomes general, then surely the institutionalization process has been achieved. If the researchers go out themselves to look at farmers' problems and start devising methods to solve them, the FSR/E approach should be well on its way. But, has it done so in Tanzania? It would be worth a two week visit to go and find out (A. Cunard, personal communication).

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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.³

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

³An 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).

Tanzania/FSRP - Farming Systems Research Project (621-0156)

Initial Authorization: 1982 (for 3 years)

Goal: "Increase per capita food production. Better yielding and more profitable crop varieties and practices developed and dispersed to farmers."

Purpose: "To improve the food crops research program...by increasing its relevance to farmers through the introduction of a farming systems approach to research"

Outputs:

1. Research planning and management guidelines and plans developed by the Tanzania Agricultural Research Organization to: (a) conduct farming systems research; (b) strengthen the linkages between on-farm and off-farm research; and (c) establish linkages with other GOT institutions serving agriculture;
2. Agronomic research recommendations for maize, legumes, and/or sorghum/millet in each of the Central, Norther, and Western agro-ecological zones in Tanzania;
3. Five-year plans for major food crops implemented and coordinated by Tanzanian researchers;
4. Improved physical facilities at Ilonga Agricultural Research Institute;
5. Crop trials program expanded;
6. Crop genetics improvement program continued; and
7. Short- and long-term training continued.

Specific FSRP objectives relating to FSR were:

- To develop and institutionalize within the Tanzania Agricultural Research Organization a capability to sustain and extend adaptive (on-farm) food crop research nationally;
- To develop and test a methodology for using the FSR approach as a research and information dissemination strategy; and
- To integrate the FSR approach with the ongoing food crop research program.

Implementing Agency: Tanzania Agricultural Research Organization (TARO).

TA Contractor: Consortium for International Development, with Oregon State University as lead university.

Evaluations: Two -- in 1986 (Jackson and Osburn, 1986); and a Project Completion Report in 1986 (Faught, 1986).

Constraints: C.4, C.4 (+), O.2, O.3, O.8, G.3, G.6.

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