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Case Study No. 12

ROCAP Small Farm Production Systems Project (596-0083)¹

by

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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)
Senegal Agricultural Research and Planning (685-0223)
Tanzania Farming Systems Research (621-0156)
Zambia Agricultural Development Research & Extension (611-0201)
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ROCAP Small Farm Production Systems (596-0083)

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ROCAP Small Farm Production Systems (596-0083)

The Small Farm Production Systems (SFPS) Project was authorized, as a four year project, in 1979 for \$7,403,000. The SFPS Project was an initiative of the USAID Regional Office for Central American Programs (ROCAP). The Project Grant Agreement with the project's implementing agency, the Tropical Agricultural Research and Training Center (CATIE) in Turrialba, Costa Rica, was signed in April 1979.

SFPS grew out of the predecessor ROCAP-funded Small-Farmer Cropping Systems (SFCS) Project (596-0064) also implemented by CATIE (Hobgood, et al., 1980). A distinct product of the SFCS Project was the development of the initial steps of a farming systems research (FSR) methodology. As a regional project, SFPS provided support for FSR in Costa Rica, El Salvador, Guatemala, Honduras, Panama, and for a time in Nicaragua.

The SFPS Project was evaluated three times--in 1981 (Mann, et al., 1981), in 1982 (Warnken, et al., 1982), and in 1985 (Jones, 1985; and Zimet, et al., 1986).

The second evaluation, conducted in September 1982, recommended that the project be extended to allow more time for CATIE to carry out the animal production and mixed systems phases of the project. The PP amendment of June 22, 1983, extended the PACD from September 30, 1983, to June 30, 1985, and increased LOP funding by \$597,000, to bring the total grant to \$8,000,000. The project was later extended to September 30, 1985, to provide additional time for CATIE to publish the research information generated by the project.

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

In June 1973, the Government of Costa Rica and the Inter-american Institute of Agricultural Sciences (IICA) signed an agreement to establish CATIE at Turrialba, Costa Rica. The agricultural research station at Turrialba was originally established by IICA in 1942. Between 1960 and 1973, research activities were carried out by two predecessor organizations to CATIE--CEI from 1960 to 1969, and CTEI from 1970 to 1973.

The purpose of CATIE is to increase agricultural, livestock, and forestry production and productivity, particularly among the small farmers of Central America, with the goal of improving the living standards of small farmers. The objectives of CATIE, similar to those of the SFPS Project, are:

1. To promote research, in cooperation and coordination with national institutions, toward development of applicable, farm-level technologies adaptable to producers' conditions.
2. To promote training at different levels, in coordination with national institutions, of technical personnel in charge of research and technology transfer in these institutions.
3. To cooperate with national institutions in creation of models to accelerate the process of technology transfer aimed at increasing production and productivity at the farm level.

CATIE has four major program areas--annual crops, animal production, natural renewable resources, and perennial plants. Primary attention in SFPS was given to annual crops and animal production, both at Turrialba and within cooperating countries.

CATIE's first ROCAP-funded project, the Small-Farmer Cropping Systems (SFCS) Project (596-0064), which operated through fiscal years 1975-79, established the foundation for SFPS. The SFCS Project sought to help small farmers develop more productive and balanced cropping systems that would provide better nutrition and food security for the family and yield a greater surplus for higher family cash income.

The project strategy was to develop a cadre of agricultural scientists at CATIE who would work with national agricultural institutions throughout Central America to conduct collaborative on-farm cropping systems research with small farmers.

The major deviation from earlier cropping research was to concentrate on cropping systems rather than specializing in mono-cropping.... Systems may include mono-cropping, inter-cropping, rotations and relay cropping of adapted crops on the same land within a production period. Another notable change was to shift many projects from research stations to the farmers' own fields (Mann, et al., 1981:34-35).

Also, SFCS sought to develop improved methodology, particularly a systematic approach for adaptive, problem-oriented research to be conducted on individual farms.

The design of the SFPS Project was influenced by the findings of a 1980 evaluation of the SFCS Project (Hobgood, et al., 1980). As summarized by Mann, et al. (1981:35-36), the 1980 evaluation of the SFCS Project found that:

1. The project had played a vital role in helping CATIE transform itself from a traditional agricultural research and graduate training institution, focused primarily on mono-crop research, to one with a demonstrated capacity for small farm systems research.
2. CATIE's cropping systems (CS) methodology could improve multi-cropping technology for increasing small-farm production.
3. The CS methodology had helped to get researchers away from the experiment station to on-farm settings where they learned a great deal about small farmers and their complex problems.
4. The project had enabled CATIE to contribute to a more integrated approach to SFCS research in the region.
5. CS research had influenced the farming operations of some of the 75 participating farmers but it was too early to expect large-scale farmer adoption.
6. The project (with appropriate changes) would be both replicable and sustainable, and could serve as a powerful tool in helping small farmers.

The evaluation of the SFCS Project identified the following "lessons learned" (Mann, et al., 1981:36-37):

1. To maximize potential impact on small farmers, cropping systems projects should be designed to include the full research cycle through verification and dissemination.
2. An interdisciplinary focus across all participating disciplines is critical in the farming systems approach.
3. Researchers must differentiate between doing research on small farms and doing research with small farmers on their farmers.
4. The CS methodology can be improved with greater attention to:
 - a. Use of more explicit and consistent criteria for selecting farm households for on-farm trials;
 - b. More careful articulation of the relationship, if any, of central station experiments to on-farm trials;

- c. More careful analysis of yield and income data from on-farm experiments and their relationship to base-line survey day; and
- d. Non-agronomic elements, such as input constraints, market analysis, and household and area labor availabilities by seasons.

The SFPS Project's goal was to "improve the regional conditions in which the rural poor will have increased outputs and income from the land they work." The project purpose was to "develop a continuing Central American capability to conduct and convey to small farmers crop, animal, and mixed-farming production systems research." Pursuant to this goal and purpose, the PP provided that CATIE and national agricultural research institutions in Central America and Panama would undertake a program of research that would:

1. Place priority on the special needs of small farmers;
2. Focus on the whole farm system of the small farmer and the interrelationships among technology, service institutions, and economic, social, and cultural factors affecting small farm agriculture;
3. Make extensive use of field testing on small farmer plots to adapt basic research to local conditions; and
4. Place special emphasis on developing methodology for dissemination of research results and recommendations to other small farms in the vicinity and in other similar areas of small farmer agriculture in Central America and Panama.

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

The outputs that the SFPS Project was expected to achieve by project conclusion in 1983 were specified in the project's Logical Framework, as follows:

1. Methodology for development of crop, animal, and mixed farming systems recommendations.
2. Crop, animal, and mixed farming system recommendations for specific areas;
3. Baseline information and research results where small farms are concentrated;
4. Extrapolation of methodology for transfer of CS

- recommendations from one geographic area to another;
5. Recommendations for transfer of production system tech-packs to small farmers;
 6. Training through short courses and graduate training;
 7. In-service training through direct participation in field research; and
 8. Institutional capacity to continue technical assistance for production and transfer of recommendations.

To achieve these outputs, the SFPS Project provided funding for project staff salaries, field operating expenses, and short-term and M.S.-level training.

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

At the time of the first evaluation, ROCAP was providing funding for a total of thirteen professional staff members who worked full-time on the SFPS Project; seven were located at Turrialba, while six were stationed as representatives in the six cooperating countries. Additional professionals working full- or part-time on the project were funded by other organizations (EEC, IDRC, IPPC, ODA, IFAD, and GTZ).

1. Annual Crops

The objectives of the annual crops program were to refine a cropping systems research methodology that could be adapted to different kinds of areas within the cooperating countries; to develop multiple cropping systems in the form of production alternatives (tech-packs) that could be applied by small farmers in their overall farming systems; to cooperate with animal production scientists in developing alternative mixed farming systems to combine crop and livestock enterprises into more productive and profitable overall farming systems; and to develop a methodology for transfer of validated production alternatives to farms in a given area and for extrapolating these alternatives into other similar areas.

The project staff developed a seven-step procedure for conducting farming systems research (FSR): (1) area selection; (2) characterization; (3) design of alternatives; (4) evaluation (on-farm, researcher-managed trials of chosen tech-packs); (5) validation (farmer-managed trials); (6) diffusion (transfer or dissemination of an improved production alternative to other similar farms in the area); and (7) continuation (monitoring performance of a tech-pack over time and making needed adjustments as conditions change).

The first evaluation noted that CATIE researchers primarily viewed the sixth step (diffusion) as an extension function, and were initiating plans to start training extension workers by getting them involved in the validation stage. Proposals were also being considered to add staff to CATIE to concentrate on developing and testing new, non-traditional diffusion techniques to reach large numbers of farmers more quickly.

Generally, the project developed production alternatives by carrying out on-farm research in the fields of farmers in each country. This was carried out by a country resident employed by CATIE. He or she worked with personnel of a cooperating country institution. At times, CATIE hired local technicians to assist in developing the in-country program, while CATIE staff provided support in such areas as programming, training, conducting workshops, and solving problems which arose.

2. Animal Production

The objectives of the animal production program, which began with the SFPS Project, were to assist small farmers in improving productivity of their animal enterprises to provide better nutrition for the farm family and to make a greater contribution to the family's cash income. Further, the program sought to develop production systems to make fuller use of available resources.

The project staff developed a six-step methodology for carrying out animal production research. The six steps were: (1) area selection; (2) characterization (development of an area profile through a diagnostic survey); (3) need identification; (4) design research (setting up a module covering all phases of the complete production unit); (5) implementation research (setting up a trial at Turrialba); (6) adaptation and perfection (setting up a research trial on a farm); and (7) on-farm tests (a continuation of the production module test with the production and managerial decisions made by the farmer). At the time of the first evaluation, station- on farm-based work was underway with cattle but station-based research was just getting started with chickens, goats, pigs, and sheep.

3. Mixed Farming Systems

Mixed farming systems researchers seek "to orient their research efforts and recommendations more in line with the task small farmers always have faced - how to put crop and livestock enterprises together in a more productive and profitable way" (Mann, et al., 1981:61). In 1981, CATIE staff had not yet conceptualized research methodology for the mixed farming systems program. Some researchers felt "that individual crop and livestock tech-packs are not sufficiently developed to permit exploration of combinations - especially for livestock enterprises for which less time has been available for development (Mann, et al., 1981:61).

4. Methodology

The third evaluation noted that the idea of validation and transfer had been included in the PP but not in the original Project Agreement (April 1979). That agreement identified the need to develop an effective method to transfer research results to producers. However,

CATIE equivocated somewhat here, arguing with ROCAP that they were a research institution and had neither the expertise nor the resources to pursue the matter adequately. But ROCAP pressure mounted, and in 1982 a fifth stage-- Validation and Transfer--was added to the CATIE systems research methodology, and CATIE hurriedly began to validate some of the technological alternatives developed earlier (Jones, 1985:4).

This was formalized in Project Agreement Amendment 3 (May 11, 1982). As generally understood, Validation and Transfer is a composite step, with validation being the final step in research and transfer the first step in extension. However, the "joining of the two as a single action as well as the late addition of V/T to the project (even considering the extended termination date of 30 June, 1985), added much confusion to a difficult situation" (Zimet, et al., 1986:4).

Two problems made the situation difficult. First, the close relationship between research and extension required for FSR/E was generally lacking at the country level. Second, CATIE's relationship in the field with national research institutions was often weak, while that with extension was generally lacking. The CATIE-national research institution link was weak due to the lack of resources on the part of national institutions. Since CATIE usually worked through the national research institution, the CATIE-national extension link was strong only when the national research-extension link was strong.

While data collection was an important element in SFPS, the third evaluation felt that the project had collected more data than could be analyzed and used. For example, the characterization document required by the Project Agreement, was dated 1984, several years after the CATIE field technician had departed the area (Zimet, et al., 1986:24). Another example:

At most project sites the [evaluation] team inquired as to documents received from CATIE that could be considered useful for feedback into...research.... In no instance were such documents available (Zimet, et al., 1986:24).

The team concluded that the large amount of data collected had slowed down analysis, indeed had made analysis "too slow to perform the important FSR feed-back function" (Zimet, et al., 1986:25).

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

By the time of the first evaluation, crops research at Turrialba was being done on a cropping systems basis. Further, the evaluation found that small farmer participation in the on-farm component of the SFPS Project had been good.

No work is done at Turrialba on testing and validating production alternatives (tech-packs). The farming system trials, tests, and validations of tech-packs are all conducted with small farmers on their farms in the cooperating countries (Mann, et al., 1981:44).

On several small farm operations observed by the first evaluation, CATIE-generated technology improvements had been applied successfully. However, the evaluation reported that: "Inability to accommodate all farmers who desire to cooperate has been the primary constraints, rather than the reverse" (Mann, et al., 1981:1).

The first evaluation (Mann, et al., 1981) organized its findings in terms of annual crops, animal production, and mixed farming systems.

1. Annual Crops

Much of CATIE's cropping systems (CS) research program under the SFPS Project was reoriented to a systems approach involving various CS forms (mono-cropping, inter-cropping, relayed cropping, and rotations). The CS methodology, the first evaluation found, seemed "logically conceived, systematically formulated, and quite workable with farmers under field conditions" (Mann, et al., 1981:50). The evaluation also found that CATIE staff seemed "to have accepted the new approaches in an enthusiastic manner and conveyed this to country representatives" (Mann, et al., 1981:41). Further evidence of a reorientation was seen in the restructuring of educational and training curricula "to embrace the philosophy and methodology of the systems approach" (Mann, et al., 1981:41). Most important, the evaluation added, was "the experience gained in working with farmers on their farms in applied crops research" (Mann, et al., 1981:41).

The evaluation noted that SFPS staff had found the question of developing a technology transfer methodology (for diffusion within an area and extrapolation to other geographic areas) to be very troublesome. According to the evaluation, CATIE staff lacked

confidence in their innovative ability to conceptualize, evaluate, and validate the "non-traditional transfer techniques" specified in the Project Paper -- a task which seems far beyond their realm of experience and highly specialized technical training in agronomy and related fields. They feel that the necessary "tooling up" for them to attempt this assignment without professional help from trained transference personnel would be a very inefficient use of their time and would divert and dilute their efforts in their primary responsibilities for developing the required tech-packs... (Mann, et al., 1981:50-51).

But the evaluation noted that the project had already initiated "a very sound approach for diffusion of information within a project area" by training area extension workers to help in collecting data from cooperating farmers and in assisting in the analysis and interpretation of results. "This probably is by far the most effective way to train and motivate local extension workers to understand and help disseminate the new technologies to other farmers in the area" (Mann, et al., 1981:51).

Also troubling SFPS staff was the project's requirement for developing tech-packs for mixed farming systems. On this point, while the project design called for a specific number of technology packages to be developed, the evaluation noted that

the project's success depends primarily upon successfully achieving other outputs -- development of methodologies, institutionalization of the methodologies, and training of country personnel -- rather than on development of technology alone (Mann, et al., 1981:8).

There were also administrative problems. SFPS staff found that the time requirement for submitting annual work plans (in preliminary form by November 30), was problematic.

First, since harvesting and evaluation of the current year's crops are not yet completed, data are not available to guide next year's planning. In addition, December is a difficult time to get material assembled since many co-workers... arrange vacations and observe holiday during this period. Finally, in-country annual plans are not prepared until the January/February period, making it difficult for CATIE Country Representatives to coordinate their planning with that of national institutions (Mann, et al., 1981:52).

2. Animal Production

At the time of the first evaluation, research on animal production had been underway a relatively short period of time compared with the history of annual crops research at CATIE. But the evaluation team reported that it had been "impressed" by the competence of the animal production staff members and "their enthusiasm for the systems approach."

3. Mixed Farming Systems

Because this area of research had not yet been conceptualized at the time of the first evaluation, the evaluation team suggested that the project initiate a pilot "laboratory-like workshop" in a convenient location with a selected cocoperator farmer.

Crop and animal technicians would visit the farmer as a group and conceptualize two or more crop-livestock combination[s] which seem workable to them and to the cooperating farmer. This may involve combinations of "proven crop and livestock tech-packs," if available. If not, enterprise selections and combinations would be made on the basis of collective best judgements of the entire group and the farmer - surely better than the farmer could do alone. The resulting mixed system would be treated as an on-going case study with complete records of performance being kept from year to year (Mann, et al., 1981:62).

4. Complete Family Farming Systems Research Approach

The first evaluation noted that this activity had received little consideration by project staff. The PP had outlined this activity as follows:

Using the experience gained to date, CATIE will expand its research efforts to incorporate a wider farming systems approach, i.e., a complex interdependent association of plants, animals, soils, labor, tools, and other inputs, all influenced by the ecological and socio-economic environment, and predominantly dependent upon the farmer's knowledge, ambitions, and abilities. . . . thus, effective technological alternatives must be designed within the conceptual framework of a small farm, tested on-site and under the farmer's management, and evaluated in terms of appropriateness to the farmer's existing system, ease of understanding and adoption and increased income and employment generation.

Farming systems methodology is a procedure for constructing area-specific farming systems recommendations. . . . The proposed project expands this (the project 596-0064) methodology to include a complete farming research approach, i.e., take into account the physical environment, the socio-economic conditions, and the design of appropriate alternative sub-systems (including crops, animals, and mixed farming) (cited in Mann, et al., 1981:63).

To address the challenge of this project requirement, the evaluation team recommended that the SFPS consider initiating a pilot study to introduce a

complete farming systems approach in 1981 so that it may evolve concurrently with other phases of the project over the next three years. This would involve a selection of a typical farm in a selected area, conveniently located, which could be used as a "practice farm" for staff orientation and involvement. . . . With the cooperation of the selected farmer, and local professional staff, this might be continued as an on-going experimental pilot study. Records would be kept of both production and economic performance as the system evolved over time (Mann, et al., 1981:64-65).

The evaluation cited, as an example, the methodology that had been conceived and evolved in Missouri over a period of many years as the basis of a state-wide extension program.

However, the evaluation observed that the success of some of the farm operations developed by the project seemed

to depend heavily upon considerably more than application of the technology introduced. They required intensive assistance by CATIE and/or national institution personnel in obtaining credit (or directly providing resources), locating and installing inputs, generating markets, etc. This emphasizes the fact that improved technology is a necessary, but far from sufficient, ingredient to transform the income and condition of the small farmer (Mann, et al. 1981:2-3).

The team noted that improvements in the small farm system will not likely take place on more than a few farms unless there are complementary activities to provide small farmers access to input and output markets, credit and continuing technical assistance.

The second evaluation of SFPS (Warnken, et al., 1982) found the project to be capably managed, with a potential for significant impact on the welfare of small farmers. Participating national programs were using the farm-based methodology developed by CATIE. However, development of the mixed systems (crop-animal) methodology was just getting underway, while alternative technology transfer methodologies still had not been identified, developed, or tested. Further, project outreach via national extension services was very limited. As a result, technologies already available under the project had not been transmitted beyond the limited number of farmers cooperating closely in the implementation of the project's on-farm research.

Overall, SFPS had continued to improve CATIE's capability to do research in farming systems and to advise and assist national agencies. While training of national personnel in FSR by CATIE had exceeded intended project outputs, institutional capability to support SFPS at the national level continued to suffer due to personnel turnovers, fluctuating financial resources, and program content modifications. However, CATIE had come to be recognized as one of the leading institutions in FSR.

To allow time for the completion of the project's planned outputs, the second evaluation recommended that the SFPS Project be extended by two years, and that the project incorporate a strong extension and communication component to better ensure the utilization of the project's findings.

The third SFPS evaluation, conducted in September 1985, by the University of Florida/Farming Systems Support Project (FSSP) (Zimet, 1985), found that SFPS had been a success in achieving its purpose (i.e., to develop a continuing Central American capability to conduct and convey to small farmers crop, animal, and mixed farming production systems research). Overall, the evaluation found that project outputs had generally been met or exceeded, and that the project had contributed, in a major way, to positively modifying collaborating institutions' approach to conducting agricultural research and demonstrations.

On the other hand, the evaluation team questioned aspects of CATIE's FSR methodology, particularly its emphasis on developing complete technological packages vs improving single components of production systems. The PES (A.I.D., 1986) noted that CATIE disagreed with the team's conclusions concerning FSR methodology. These dealt mainly with differences in FSR methodology between the FSSP and CATIE, and the degree to which CATIE should coordinate and conduct field research in cooperating countries.

For example, in the case of crops, the evaluation noted the following pattern in CATIE's on-farm trials. "The trials were managed by researchers and the inputs were furnished." Further, "more field management was given by CATIE staff than should be done at the validation stage" (Zimet, et al., 1986:42). Further, the evaluation noted that there were instances where CATIE performed validation when research was not really complete.

It did so in order to confirm with the obligation to validate "tech packs." . . . The [evaluation] team believes that validation should test the acceptability (by the producer) of the technology... This cannot be accomplished if the field team is involved in the management of the production-site or if inputs are supplied to the farmer. Thus, we believe that CATIE validated the technical efficiency of the technology...and did not attain the goal of validation (Zimet, et al., 1986:41)

CATIE acknowledged that too much emphasis and time had been spent on collecting data and preparing reports that characterized farming systems in detail. However, CATIE strongly felt that the evaluation team had been unfair in faulting CATIE's approach to validation of technology. While CATIE recognized the importance of the team's definition of validation (testing a technology's acceptability by a farmer), CATIE saw validation as a further stage of research than CATIE was trying to accomplish under the project (A.I.D., 1985). In response to this, the evaluation team stated the team's belief

that a good part of the [CATIE] effort was misspent because the validation was generally of the technology not of the acceptability of the technology. (The result of doing the former is a reduced frequency of adoption by producers). What the team (as well as most practitioners) believes to be the correct definition would have been applied had either CATIE or ROCAP been better versed in FSR/E techniques. It is thought that ROCAP should have supported CATIE staff so that they could have attended and participated in international FSR/E symposia. Such contact with other practitioners would have helped to increase the awareness of more recent thinking than that which was used to define validation under the project amendment (Zimet, et al., 1986:126).

The third evaluation also noted that CATIE had not addressed

critical issues in the transfer phase of the technology development and transfer process. Specifically, CATIE did not address the issue of leveraging change in key agri-support systems. In the case of annual crops, "there was no parallel planning of commercial stocks of seeds of new crops and/or varieties. This led to some delays in the early acceptance of technologies tested that depended on this input" (Zimet, et al., 1986:42).

Overall, the evaluation concluded that transfer (dissemination of the new technology), an extension exercise, needs to have strong links with research and other agri-support entities such as credit institutions. The evaluation cited two examples from Comayagua, Honduras that displayed the importance of overcoming the credit constraint of a new technology.

the maize program has had little success and a poor prognosis for wide-spread adoption of the new technology that was developed. In comparison, the rice program has been relatively successful and has a good prognosis for wide-spread adoption. In the case of maize, farmers have adopted the variety and planting density aspects of the recommended package. The aspects of fertilizer and other chemical inputs have not been adopted. Lack of financial resources to pay for the chemicals was the reason given for the extremely limited adoption of the entire package. . . . In the case of rice, the recommended technology was little different from that commonly used. The recommendations were those of timing of insecticide and fertilizer application and of fertilizer composition. Costs of production associated with the recommendation are only slightly greater than those of the common practice (Zimet, et al., 1986:44-45).

This comparison illustrates that transfer will depend on limiting the costs of the new technology or ensuring that farmers have access to the capital required to finance the increased costs of the technology.

The third evaluation also expressed reservations about the project's emphasis on characterization and extrapolation.

Characterization -- The technique of characterizing the farmer clientele at project sites in each participating country "was observed religiously at the outset of each country project" (Zimet, et al., 1986:59). The evaluation noted that it was not clear "precisely what were the objectives to be achieved and how they were to be reached" (Zimet, et al., 1986:59). Additional observations concerning characterization, "tech packs," and extrapolation were as follows:

- There was limited multidisciplinary involvement of host country and CATIE personnel during the survey process.

- The survey instrument required too much time to complete (up to four hours per respondent in Panama) and precluded or limited the farmer from providing his perspective on his problems.
- Survey data were sent to Turrialba for analysis instead of being analyzed on site as a cooperative effort between host country and CATIE personnel; further, the data were not analyzed in their entirety.
- The evaluation of prospective farmer participants did not include a social perspective, which could have influenced the final research orientation.
- "The imposition of extrapolated, preconceived models on a particular clientele group, particularly without social science input, following an expensive characterization seems contradictory to the ideas supporting a characterization" (Zimet, et al., 1986:59).

"Tech Packs" -- The evaluation noted the appealing nature of the technology package concept and that this concept has been used for many years, particularly in supervised credit programs. But such technology packages have not been frequently successful. Indeed, because of their new management requirements, technology packages often have been too complicated or different from common practice to be applied without outside supervision. Or they may require more capital than the farmer has available or is willing to use.

The evaluation noted that the project had developed "tech packs." However, the evaluation found that the more successful "tech packs" were

those that were only slightly different from common practice. They were based...on specific changes of specific components. This supports our view as to the importance of component research. Not only will the time requirement for research be cut but also acceptability would be increased with changes based upon a small number (2-4) [of] component changes as opposed to a completely new package (Zimet, et al., 1986:60).

Extrapolation -- SFPS designed and implemented a "very intensive and sophisticated approach" (Zimet, et al., 1986:57) to test a corn-sorghum association in Guatemala, El Salvador, Honduras, and Nicaragua during 1981-84. This activity was directed at developing one of the project's expected outputs, a "methodology for extrapolating...cropping systems research from area to similar area...." Empirical models and natural resource inventories provided the basis for extrapolation.

However, the third evaluation doubted the usefulness of

extrapolation to the small farmer. The evaluation cited four reasons why extrapolation is not to be recommended as a step in FSR/E. Most notably, CATIE's approach to extrapolation (i.e., dependent on top-down criteria) was inconsistent with the farming systems approach and did not consider farmer participation in the local research and validation process. Further, the extrapolation models used considered only biophysical factors and not socio-economic conditions that influence the small farmer's decision making. The evaluation also noted that there was little reliable agro-climatic information in the region that could justify the extrapolation concept. Finally, the extrapolation approach developed by CATIE was very costly. The evaluation team felt that: "The effort and cost involved in the characterization of homologous areas and the permanent research required for every set of commodities can better be used to solve priority problems in each region" (Zimet, et al., 1986:58).

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?

In all countries visited (Costa Rica, Guatemala, Honduras, and Nicaragua) by the first evaluation team, there was a high level of interest in SFPS. This interest, however, had not yet been translated into adequate budget and personnel resource commitments. In Costa Rica, for example, the evaluation noted that there was "little or no integration" of CATIE's SFPS activities with potential Costa Rican cooperating institutions. "Until this happens the impact of the SFPS project in Costa Rica will be limited" (Mann, et al., 1981:97). In the case of Guatemala, the evaluation noted that, "if it were not for SFPS project funds being made available for fuel purchases, the level of farm trials and tests in the area would be severely curtailed" (Mann, et al., 1981:104). Further, the evaluation team concluded that: "The greatest constraint to expanding the work to new areas seems to be the lack of adequate financial support for ICTA by the national government" (Mann, et al., 1981:104).

In the area of training, the first evaluation concurred with CATIE's recognition of the need for continuous and repetitive training for personnel of national institutions because of rapid turnover. Here the evaluation expressed the concern that:

Despite the fact that CATIE has done a good job training..., ...there will not be sufficient numbers of adequately trained country institution personnel to carry on a viable program beyond termination of the CATIE/ROCAP project (Mann, et al., 1981:15).

However, by the time of the third evaluation in 1985, the SFPS Project had provided training to over 1,500 participants in a variety of short courses and workshops compared to the design requirement of 1,000 participants. A total of 19 (as compared with a design requirement of 11) Central Americans received M.S. degrees in areas related to FSR/E. "Overall," the evaluation concluded, "training was the most successful aspect" of the [SFPS] program" (Zimet, et al., 1986:45-46).

Further, a picture had begun to emerge of the impact of the SFPS Project on the institutionalization of FSR/E in the participating countries.

Costa Rica -- Shortly before the project's field activities ceased in June 1985, the Ministry of Agriculture (MAG) was being reorganized with funding assistance of a BID project. A new organization, Programa de Incremento de la Productividad Agrícola (PIPA) was to establish a close working relationship between research and extension. FSR methodology was not operational in the MAG at the time SFPS ended but a number of MAG personnel had worked with or been trained by SFPS. The third evaluation team felt that trained personnel were available to implement FSR/E "if and when they are given the mandate to do so" (Zimet, et al., 1986:14). However, while these persons were making at a strong input, at the time of the third evaluation, in the formation of the organizational plan and methodology of PIPA, the evaluation noted that "methodological errors inherent to the CATIE program" were being incorporated into the new research and extension program (Zimet, et al., 1986:54).

El Salvador -- Crop research and extension are combined under CENTA, an autonomous entity of the Ministry of Agriculture (MAG). "Creation of a Department of Production Systems for Small Farmers within the Crop Research Division of CENTA is one of the strongest indications of CENTA's commitment to FSR/E" (Zimet, et al., 1986:15). Further, the third evaluation noted that "CENTA has accepted the farming systems methodology.... Under CENTA the future of farming systems seems bright. No such statement can be made for animal production" (Zimet, et al., 1986:3).

Guatemala -- Agricultural research is coordinated by the Agricultural Science and Technology Institute (ICTA). During the life of SFPS, there was much friction between ICTA and CATIE. "ICTA's position was that there was no reason to seek crop or farming systems research assistance from CATIE when they had their own research methodology" (Zimet, et al., 1986:15). As a result, CATIE's FSR program was limited to cattle. However, since FSR/E had already been established in Guatemala by ICTA, the evaluation felt that the "prognosis for the continuation of farming systems work in Guatemala is excellent" (Zimet, et al., 1986:3-4).

Honduras -- The Natural Resources Secretariat (SRN) func-

tions as the ministry of agriculture. Crop research and extension are separated from that for livestock. SFPS operated in the Comayagua Valley. "If resources are forthcoming the farming systems methodology will probably spread in Honduras as regards crop production. It is...less likely...that such will occur in the area of livestock production" (Zimet, et al., 1986:4).

Panama -- The Agricultural Research Institute (IDIAP), an autonomous institute of the Ministry of Agricultural Development (MIDA), conducts crop and livestock research. The National Agricultural Extension Service (SENEAGRO), also in MIDA, is responsible for extension. Noting that there was a poor relationship between IDIAP and SENEAGRO, the third evaluation thought that FSR/E "can be conducted successfully under the present organization of IDIAP. If IDIAP can expand its staff or if the IDIAP-SENEAGRO relationship were improved the prognosis for farming systems research in Panama would be excellent" (Zimet, et al., 1986:5).

CATIE -- CATIE is funded along project lines; thus, there are many staff members who are not permanent and CATIE may lose, from one project to the next, personnel who gained experience on an earlier project. Thus, "our prognosis for continued FSR/E work at CATIE is pessimistic unless the training and staffing recommendations we present are followed" (Zimet, et al., 1986:5-6).

On this latter point, the third evaluation offered the following elaboration:

CATIE operates on a project-by-project basis. Thus, even though some personnel that worked under the FSR project are presently working on other CATIE projects, such as Integrated Pest Management (IPM), they are not applying the FSR methodology. This is particularly distressing in several cases where the team believes that the FS approach would enhance the other projects. . . . Given this situation..., it is not possible for the team to state that the project has enhanced the ability of CATIE to carry out FSR on a continuing basis. It has been able to do so only partially under the specific case of the SFPS project (Zimet, et al., 1986:12-13).

It is interesting to note that the evaluation team found that by the time the team had started its evaluation, most SFPS personnel "were already employed elsewhere" (Zimet, et al., 1986:19).

The third evaluation noted several "lessons learned" by SFPS Project experience. These were:

1. Developing and maintaining effective collaboration among various departments in an institution requires considerable time and effort, is influenced heavily by personalities and leadership skills, and cannot be taken for granted.
2. Effective farming systems research requires a significant degree of collaboration among national research, national extension agencies, and farmers. This collaboration should be evident in the types of training and research conducted, in the types of publications produced, and in the continuity of activities.
3. Farming systems research is a concept rather than a project; once the concept is recognized for its merits, the problem is to systematically include the concept in a broader range of research, extension, and development activities.

Yet the third evaluation noted, in its Executive Summary that

The concepts of farming systems research have changed over time. . . . It must be remembered that farming systems concepts at large and at CATIE are still evolving. The search for a paradigm has been intense and changes have been rapid (Zimet, et al., 1986:6).

In this area, the evaluation felt that CATIE staff had become "isolated from developments in FSR/E" (Zimet, et al., 1986:6). For example, looking back on the project's work with "tech-packs" and "modules," the evaluation recommended that CATIE's research program place greater emphasis on technology components to provide a basis for making recommendations to farmers on technology alternatives that farmers could incorporate according to their needs and capacities.

Yet, despite differences of opinion in regard to methodologies used, the third evaluation concluded that CATIE's SFPS Project had a "positive influence" on initiating "the practice of working on-farm" in the participating countries. In most cases,

this had not been done previously to any great extent. Because of the effort that was made by CATIE, the countries that participated in the CATIE-ROCAP farming systems project are now better able to run their national farming systems research and extension project[s] (Zimet, et al., 1986:6).

However, looking back on constraints to project implementation, the third evaluation found that SFPS effectively supported the national-level field teams. Because of the funding provided by the project, these teams had

adequate resources at their disposal to conduct experiment station and on-farm research. Their transport as well as the production inputs required for the research [were] supplied by the project. Thus the project did enable CATIE to conduct a Farming Systems Research Project (Zimet, et al., 1986:20).

But the evaluation voiced concern that the funding may have been "too generous because national institutions did not develop means to continue the research" (Zimet, et al., 1986:20). Indeed, the third evaluation reported that only about 40% of the SFPS sites were presently involved in FSR/E. While representatives of national institutions expressed that they would like to expand FSR/E to include other geographic areas, "all that was lacking were funds to do so" (Zimet, et al., 1986:25).

In the case of CATIE, the third evaluation recommended that CATIE:

- Discontinue farming systems "as a project" but that farming systems components "be incorporated into other projects" (Zimet, et al., 1986:6) via training and utilization of farming systems methodology;
- Retain core research staff competent to supply FSR/E support to CATIE projects as well as national level FSR/E projects;
- Develop a strategy to provide FSR/E training to CATIE staff working on other projects; and
- Include farming systems in the Center's academic curriculum.

Other CATIE projects in which the FSR/E approach could be incorporated included IPM, watershed management, and fuelwood. "Many of the specific problems in these areas are farm production or farm family consumption problems which should be studied from the point of view of the farm family in order to be resolved" (Zimet, et al., 1986:25-26).

In conclusion, at the time of the third evaluation, the evaluation team felt that CATIE had the capability to respond to national-level requests for information and technical assistance on FSR.

The future, unfortunately, is uncertain. The team does not feel confident that this capability will remain with CATIE. The critical staff could leave upon termination of current CATIE responsibilities for the SFPS project (Zimet, et al., 1986:26).

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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).

ROCAP/SFPS - Small Farm Production Systems (596-0083)Initial Authorization: 1979 (for 4 years)Goal: To "improve the regional conditions in which the rural poor will have increased outputs and income from the land they work"Purpose: To "develop a continuing Central American capability to conduct and convey to small farmers crop, animal, and mixed-farming production systems research"Outputs:

1. Methodology for development of crop, animal, and mixed farming systems recommendations;
2. Crop, animal, and mixed farming systems recommendations for specific areas;
3. Baseline information and research results where small farms are concentrated;
4. Extrapolation of methodology for transfer of cropping systems recommendations from one geographic area to another;
5. Recommendations for transfer of production systems tech-packs to small farmers;
6. Formal training through short courses and graduate training;
7. In-service training through direct participation in field research; and
8. Institutional capacity to continue technical assistance for production and transfer of recommendations.

Implementing Agency: Tropical Agricultural Research and Training Center (CATIE).TA Contractor: Tropical Agricultural Research and Training Center (CATIE).Evaluations: Three -- in 1981 (Mann, et al., 1981); in 1982 (A.I.D., 1983); and in 1985 (Jones, 1985; and Zimet, et al., 1986).Constraints: C.2, C.2 (+), C.4, C.5, C.8, C.9, O.2, O.2 (+), O.5, O.8, O.9, G.2, G.3.

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