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Farming Systems Research & Extension Activities at CATIE

A Results Inventory

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A RESULTS INVENTORY

by

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FARMING SYSTEMS RESEARCH AND EXTENSION AT CATIE [1]

Background

The Tropical Agricultural Research and Training Center (Centro Agronomico Tropical de Investigación y Ensenanza -- CATIE) was first established at Turrialba, Costa Rica, in 1973 as the result of an agreement between the Interamerican Institute of Agricultural Sciences (IICA) and the Government of Costa Rica. The research station in Turrialba was originally established in 1942 by IICA, and between 1960 and 1973, two predecessor organizations (CEI from 1960 to 1969 and CTEI from 1970 to 1973) carried out agricultural research activities. CATIE was established as an autonomous scientific and educational institution to engage in, promote, and stimulate research, human resource development, and technical cooperation in the search for alternative technologies for the American tropics in the areas of agriculture, livestock, and forests. CATIE focuses especially on the needs of those countries in the Central American Isthmus and the Antilles; in addition to Costa Rica, Panama became a member country in 1975, Nicaragua in 1978, Honduras and Guatemala in 1979, the Dominican Republic in 1983, and El Salvador in 1987. While most of the staff is stationed in Turrialba, CATIE maintains scientific personnel and operations in six of the member countries and plans to establish operations in El Salvador soon. The Board of Directors of CATIE is composed of representatives from each of the member countries, IICA, the Inter-American Board of Agriculture (IABA), and three independent scientists.

Farming Systems Projects at CATIE

CATIE's approach to the generation and transfer of new agricultural technology has evolved substantially since its founding in 1973. This evolution can be traced in part to the various projects that have provided a substantial part of its budget, some by the experience the center was accumulating through its research and some by the stimulation provided by the methodological advances occurring in other international organizations and national programs.

Although it is difficult to designate all of the various stages through which CATIE's approach has gone, and even more difficult to determine the time at which these changes occurred, some of those with the longest institutional memory suggested the following as steps leading to the current perspective. Some of the earliest work (after 1973) was done from a "cropping systems" point of view. This focus grew out of the convictions of some of the researchers that the international agricultural research centers were working mostly along commodity-specific lines and were not looking at the mix of crops being used by small farmers. This work was largely supported by the Small-Farmer Cropping Systems project (596-0064), which was funded by the Regional Office for Central America and Panama (ROCAP). This project operated between 1975 and 1979 and was strongly influenced by the work then in progress at the International Rice Research Center.

When this project ended, it was replaced by the ROCAP-funded Small Farmer Production Systems (SFPS) project, which was first authorized in 1979 and eventually ended in September 1985. This project included animals as a part of the production

[1] The comments in this brief report are based on two days in Costa Rica. One day was spent talking with USAID and ROCAP personnel in San Jose. The second was spent talking with CATIE personnel in Turrialba.

systems and several people at CATIE now talk about this approach as being a "mixed systems" (livestock/crops) perspective. At the time, CATIE was organized into three departments -- Departamento de Producción Vegetal (Crop Production), Departamento de Producción Animal (Animal Production), and Departamento de Recursos Naturales (Natural Resources). The cropping systems project was carried out almost exclusively by the first of these. The "mixed systems" work was centered in the Department of Plant Production but some involvement of the animal production people did occur.

Two other important projects funded by donors ran concurrently with the SFPS project. The first of these was Production Systems in Specific Ecological Zones, funded by the International Fund for Agricultural Development (IFAD). This was funded at a level of a little less than one million dollars per year and lasted from 1980 until 1985. The purpose of this project was to support research and technology development for food crops for three principal ecological zones of Central America -- the Lowland Humid Tropics, the Semiarid Tropics, and the Wet-Dry Tropics. Training for national personnel was also included as well as technical assistance to national research and teaching organizations. One aspect of this project involved the creation of "prototype groups," researchers from different disciplines who worked together as a team. These were established to demonstrate to the national governments how such research and extension teams were to be organized.

The second project was funded by the European Economic Community and was titled Models of Concentrated Action. Its purpose was to use a farming systems perspective to develop alternative production systems for areas of Nicaragua, Honduras, and El Salvador. It was funded in two stages and covered the years 1982-85.

During the 1980s, there were also several grants that brought about a focus on "agroforestry systems." Some work on alley cropping occurred in connection with the Department of Crop Production, but most work was centered in the Department of Natural Resources on trees for fuelwood, and trees with multiple uses. Though this research was done from a systems perspective and included substantial socioeconomic input, there does not seem to have been a great deal of cooperation with the farming systems activities in other units.

Most of these research projects ended in the mid-1980s. Lack of fiscal control and other problems led to a several-year period in which CATIE was unable to attract significant new projects, and CATIE is currently in the process of reorganizing. A comprehensive self-review was conducted between 1984 and 1987, resulting in a ten-year plan that maps out new initiatives for the center. The ten-year strategic development plan emphasizes that this reorganization is not to be interpreted as a change of direction. CATIE is not abandoning the lessons learned during previous projects but instead will concentrate on obtaining funding for projects that are a direct extension and evolution of those research programs previously implemented.

The Status of Farming Systems Research and Extension at CATIE

Farming systems research and extension is not a term that is commonly used among the people at CATIE. Even the earlier projects reviewed above did not use the terminology, instead they frequently referred to production systems or simply "systems." There is some sensitivity among CATIE personnel about whether or not they do "real farming systems" work. In part, some of this is probably due to criticisms that have been made in previous evaluations of their cropping and production systems projects. CATIE researchers defend themselves by saying that the systems models they use developed out of the institution's own particular circumstances and necessities.

CATIE researchers feel that the institution has been particularly good at the diagnostic and technology development aspects of FSR/E, and this has been confirmed by evaluations of the program. A matter of concern with regard to CATIE's work, however, is that it has focussed much too heavily on the collection of information rather than on analysis (Zimet et al. 1986:25). To be fair, CATIE has probably done a better job of analysis and dissemination of data than national programs or some of the international agricultural research centers. CATIE has experimented with characterizations of small as well as developing regions and with using data bases to determine much larger regions for which the same or similar agricultural technologies might be useful. These characterizations and studies, however, are excessively based on crop and natural environment interactions with little or no attention paid to the sociocultural and economic aspects of systems.

CATIE has also been criticized because the institution supplied the inputs for the validation trials on farmer's fields (Mann et al. 1981:36–7) but researchers felt that this was the only way in which they could obtain results and determine whether the new technologies worked. CATIE's mandate is for all of Central America, and given the problems of working with farmers in several different countries, the scientists wanted to be sure that they would obtain research results. The organization has also been criticized for not paying enough attention to extension. CATIE has produced a lot of reports and pamphlets with new technologies, but most researchers admit that these were never communicated very well to farmers and that there has been little actual adoption of the new technologies (see also Zimet 1986:41). In part, CATIE personnel say that the responsibility for dissemination of the results was up to the extension services in each of the countries, but they admit that the extension and technology transfer aspects of CATIE's work have been a problem.

Another problem with CATIE's farming systems efforts is that it has not played a central role in establishing and maintaining a regional network of researchers (an obvious model is the network that exists in Asia). The many graduates trained at CATIE provide the basis for such a network, yet the center has never been successful in establishing a regular means for these individuals to communicate with one another and to establish region–wide programs. Attempts were made several years ago to establish such a network, but they did not go beyond sending out questionnaires asking who would be interested in participating in such a group. The effort never progressed beyond this.

Four other aspects of CATIE's involvement in farming systems work deserve comment. The first of these is whether CATIE has collaborated effectively with the agricultural research and extension systems within the Central American countries. Investigators in CATIE and the Agricultural Science and Technology Institute (Instituto de Ciencia y Tecnologia Agricolas -- ICTA) in Guatemala commented on the poor relations that existed between these two organizations. In part, this resulted from "ICTA's position ... 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). Some of these difficulties probably stemmed from ICTA's history of being established with technical assistants funded by Rockefeller and USAID who were incorporated within the organizational structure of the institute (see Ruano and Fumagalli 1988). The professionalism and pride engendered within ICTA because of this experience made it difficult for researchers to collaborate effectively with CATIE personnel, who remained outside of the structure of ICTA and who were providing unwanted "technical assistance." The resident CATIE scientist in Guatemala acknowledges the initial conflicts that occurred but reported that the situation improved once scientists worked out matters

of disagreement (Kass 1983). What this example illustrates, however, are the problems that can arise when an institution like CATIE, with a regional mandate, has to work with national institutions, all of which have different historical origins and capabilities.

A second problem is that questions were raised in the third evaluation of the SFPS about whether CATIE did a very good job of networking with other institutions that were doing FSR/E (Zimet 1986:126). Some researchers at CATIE bristled at this, saying that the original development of their work was influenced by the work of IRRI, that people like Hubert Zandstra had helped them in the early stages, and that they had almost constant contact with people from the Centro Internacional para el Mejoramiento de Maiz y Trigo (CIMMYT), the Centro Internacional de Agricultura Tropical (CIAT), the Centro Internacional de la Papa (CIP), and other institutions, and that they had lots of contact with FSR leaders like Hildebrand, Collinson, and Norman. Other CATIE researchers admitted that there probably has been a lack of networking in recent years, partially because of insufficient funds for international travel.

The third aspect deserving comment is that socioeconomic input has been lacking in many projects at CATIE (Zimet et al. 1986:59). One researcher commented that this was because the importance of socioeconomics was just beginning to be recognized in FSR/E about the time that CATIE's projects were ending. More realistically, this was probably due to other causes because the importance of socioeconomics in FSR/E was recognized at least as early as the beginning of the SFPS.

Finally, the systems research carried out by CATIE has not been firmly entrenched as a part of the educational functions of the institution. Part of this derives from the fact that in the projects that were funded by ROCAP, researchers were not permitted to teach or could only minimally participate in the teaching program. Thus, many of the individuals with the strongest commitment to farming systems research and extension were not able to transmit their knowledge and experience to the researchers in training. In addition, because most of the CATIE budget came from projects, rather than from core funding, professionals came and went as the project support ebbed and flowed. This made for a lack of continuity in the staff of the center.

These past problems and difficulties are aspects that CATIE personnel are attempting to deal with in the reorganization of the institution.

The Ten-Year Strategic Plan and the Central Role of FSR/E within It

The document Facing the Challenge: CATIE's Programs, Objectives and Strategies (CATIE 1987) outlines a ten-year strategic development plan (1988-97) for the institution. The plan attempts to build on the past experiences of the institution to effect a reorganization that will help to transform the institute to better fulfill its mandate. CATIE is a development-oriented research and education institution working toward increasing and sustaining agricultural productivity and development in conjunction with national institutions.

The team developing the strategic development plan was conscious of the previous lack of coordination among the different departments within CATIE. To better achieve its purposes, CATIE is being reorganized into three research and development programs that are to be interactive with one another. Priority is to be accorded to increasing the interchange and communication among these programs. To quote the development plan: "The three programs do not operate independently from each other. In order to achieve the institutional objectives and goals they need to be integrated" (CATIE 1987:56).

The first program is for Tropical Crops Improvement. This program will be devoted to a) improving coffee, cacao, and plantain production through obtaining more productive and disease resistant genetic material, b) collecting, maintaining, evaluating, and distributing promising tropical plant genetic resources, and c) technology development through researching critical components limiting production of coffee, cacao, plantain, and nontraditional, promising tropical crops.

The second program will now be called Sustainable Agricultural Production and Development. This program is oriented toward

> a) technology development through emphasizing research on critical components limiting production of annual food crops (rice, corn, beans, and sorghum), livestock (meat and dairy bovine cattle), and forestry, b) development of improved economic and sustainable production systems aimed at an integrated regional development, and c) development of improved methods for agrotechnology transfer and utilization of new technologies by farmers (CATIE 1987:2).

> The third program is Integrated Natural Resources Management. This program will be oriented toward

> a) providing general biophysical and socioeconomic information aimed at integrated regional resources management, b) conducting appropriate planning of regional natural resources utilization as a basis for the development of sustainable production systems, c) providing information and assistance on conservation of regional natural resources (soil, water, natural forests, biological diversity), and d) conducting research on resources management (CATIE 1987:2).

A key component of the Sustainable Agricultural Production and Development program will be a unit known as Production Systems Development. This unit will have responsibility for integrating technology developed by the three programs into technological packages that should be transferred to farmers (CATIE 1987:56). The interrelationships among the three programs are shown in Figure 1. In addition, the Production Systems Development unit is supposed to work in a complementary way with National Agricultural Research Systems (NARS) and with International Agricultural Research centers (IARCs) to assemble these improved production systems.

The technology transfer aspect will be handled through the development of pilot areas in each of the Central American countries, Panama, and the Dominican Republic. Joint and complementary efforts with national agricultural research and extension systems in these pilot areas will validate and refine the technologies. NARS will then be responsible for transferring these technologies to other appropriate areas. To further facilitate communication and cooperation, CATIE has created a network to be known as the Regional Agricultural Research and Extension System (RARES). RARES will be composed of representatives from international, regional, and national research organizations, from universities and other educational institutions, and from development organizations and projects. Though CATIE will play an important role in the organization of this system and expects that, within it, "... each participating institution would play a carefully planned, active and complementary role" (CATIE 1987:2), it is not yet clear how this organization will be organized and managed.

The other major component of CATIE activities is educational programs. The Master's degree training programs and the continuing education programs have long been

seen as one of the most positive aspects of CATIE's efforts. About a thousand MS graduates from Latin America have been trained at CATIE and the center reports receiving between 250 and 300 admissions applications for its programs each year. About one-third qualify for admission but the lack of scholarship support allows a much smaller number to enroll. From 1973 to 1983, an average of twenty-seven students were enrolled. Enrollment has been increasing and in 1987 there were fifty-nine students enrolled. CATIE promotes exchange and cooperation through the Regional Cooperative Network for Education in Agriculture and Renewable Natural Resources with more than thirty-five institutions of higher education in member countries.

Graduate training is provided in the areas of Animal Production (Animal Breeding, Ruminant Nutrition, Animal Production Systems), Plant Production (Integrated Pest Management, Plant Breeding, Tropical Soils, Agricultural Production Systems), and Renewable Natural Resources (Wildlife Areas, Watershed Management, Silviculture, Economics and Management of Renewable Natural Resources, Agroforestry). Although systems research has been emphasized for a long time, graduate students can be trained at CATIE without ever taking a course in systems. Conversations with CATIE administrators and staff revealed that some of them were strongly supportive of making the systems perspective the central organizing theme of CATIE's educational programs. Others said that because the research programs were being organized along these lines, the educational program would automatically take such a form. I did not have time to talk with staff in programs like breeding, soils, nutrition, and others but I believe this commitment and belief would be lacking in those areas. A much stronger effort to include the systems perspective -- whether in the guise of the agroecosystems perspective developed at CATIE or as farming systems research and extension -- must be made if it is to effectively transmitted to future generations of agricultural and natural resource researchers.

Another major effort in the new ten-year plan is to obtain funding that enables the center to have greater financial and institutional stability. Most of CATIE's budget (78.7 percent) has come from special projects with only a small part (21.3 percent) as core funding. This has meant that CATIE has had to shift its emphases and programs subject to the whims and fashions of the donors who provided project support. A core philosophy, continuity of staff, and accumulation of experience and capabilities has been difficult to build with such a budgetary situation.

The ten--year strategic development plan has a sound basis in programs and projects carried out during CATIE's history. It seeks to build on the past, to learn from the mistakes that were made, and to move CATIE into an even greater position as a regional technology development center. In order to accomplish this, I believe that CATIE needs to pay special attention to the following areas of concern.

Conclusions and Recommendations

1. CATIE has been an important educational resource for Latin America. The educational contributions of CATIE should be recognized and extended. An already extensive network of researchers have been trained at the institution. By strengthening the educational programs at CATIE, international donors could build upon this network to encourage greater international cooperation in agricultural research and development efforts.

2. The core budget of the institution should be expanded to reflect recognition of CATIE's strength as an educational institution and its need for organizational stability

and continuity. Because of the economic crisis affecting Latin American countries, funds to improve the quality of CATIE will probably have to come first from the international donor community. Arrangements should be made, however, to have member communities contribute funds to match those of the donors. This match can gradually escalate so that at some point the member countries would become more responsible for the continued maintenance of the center.

The project nature of CATIE's funding has meant that many personnel formerly employed have moved on to other projects and institutions. Although these individuals are undoubtedly spreading some of the ideas that they learned in these other contexts, the loss of experienced personnel is a problem for the continuity of research and education at CATIE.

3. Research and teaching functions at CATIE should be complementary activities and ways should be sought to improve the feedbacks between research and teaching. Research and teaching have not been strongly linked at CATIE since the ROCAP projects that did not allow project staff to be strongly involved in teaching. There should be more regular opportunities for CATIE researchers and instructors to fulfill both roles. Graduate students are involved in research projects at Turrialba but there is a need to integrate these students' research with their eventual responsibilities in their home countries. The program to establish pilot areas in various regions should involve graduate students by having them do thesis or practicum research projects in these regions after they finish their course work in Turrialba. These projects could be supervised by CATIE staff stationed in member countries.

4. Training in farming systems research and extension should be incorporated at the center of the graduate training curriculum. The center has made a commitment to a systems approach to the generation, testing, and dissemination of technology. For example, the ten-year plan states that a major strategic element in CATIE's reorganization is

> a need to maximize the use of a systems approach to agricultural growth and development. Emphasis would be given to research on the critical components of farm production systems and their integration into highly productive technological packages, to the use of a regional perspective for an integrated management of the resources and the development of improved systems, and to the establishment of links with other institutions in order to integrate the perspectives of planning, research, education, and development (CATIE 1987:6).

Administrators were adamant that the multidisciplinary perspective had to be extended from just the project level (as had occurred in the ROCAP projects) to the whole institution. This same commitment to the systems approach should be recognized within the academic curriculum so that the individuals trained at CATIE can apply the same approach upon returning to their home institutions.

Organizing the teaching program around a systems component would also help to better integrate the three research and development programs. Researchers and instructors in these programs who are not already committed to the systems perspective could be exposed to these ideas through their students.

5. CATIE must strengthen its staff capabilities in socioeconomics. Previous evaluations have emphasized the lack of attention to socioeconomic factors in

characterization of areas, choice of target groups for technology transfer, and evaluation of prospective farmer participants in validation trials. In addition, survey instruments have been criticized as too long and analysis as too cumbersome and time-consuming (Zimet 1986:59). CATIE administrators and program directors are conscious of the importance of socioeconomics. For example, it is stated that "... the planning component provides a product composed basically of socioeconomic information and diagnostic studies necessary to formulate specific research and educational plans to be executed in a given country" (CATIE 1988:7). Further, "... in the process of establishment of the pilot areas, CATIE along with the institutions involved will participate in a monitoring and on-going evaluation system" (CATIE 1988:14). Despite the commitment to the need for socioeconomic research, administrators express doubt about how to recruit appropriate social scientists. Existing contacts with international centers in which there are successful socioeconomics programs (e.g., CIMMYT, CIP) should be mobilized to identify qualifications and capabilities needed by anthropologists, economists, or other social scientists. The Production Systems Development area is an especially important area for social science input.

The socioeconomics area is particularly important for two reasons. First, biological agricultural scientists generally do not appreciate the important role that socioeconomists can play in the technology generation and diffusion process. Second, agricultural research and extension programs in the country programs are unlikely to have any capability in socioeconomics. The demonstration effect that such a program could have were it effectively integrated into CATIE has great potential.

6. CATIE should establish a regional network for enhancing communication among those operating with a systems perspective. This group would link graduates of CATIE's programs along with other individuals who are doing work on agricultural and natural resource systems in the region. These networks will become increasingly important if the pilot areas programs develop technological packages that are effective. Network participants could use these areas as sources of ideas and technologies for diffusion to wider areas within countries or in other countries.

The regional network is also important because CATIE has had previous success in spreading the idea of systems research to the other countries. Guatemala currently has the Proyecto de Generación y Transferencia de Tecnologia Agropecuaria y Producción de Semillas (Project to Generate Agricultural and Animal Technology and Production of Seeds) which is attempting to link research and extension. Costa Rica has a similar program called Programa de Incremento de la Productividad Agricola (Program to Increase Agricultural Productivity). Both of these projects are funded through the Interamerican Development Bank and use a systems perspective. USAID people in Costa Rica reported that, although farming systems research and extension was not a label that was used in any of their projects, many of the ideas and methods of FSR/E had been incorporated in them.

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