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Institutionalizing Farming Systems Research and Extension in Rwanda's Buberuka Highlands

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INSTITUTIONALIZING FARMING SYSTEMS RESEARCH AND EXTENSION IN RWANDA'S BUBERUKA HIGHLANDS

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INTRODUCTION

September 1986 marked the beginning of farming systems research and extension in Rwanda's North Central highlands. The Farming Systems Improvement Project (FSIP) was faced with a mandate to increase food production and to institutionalize farming systems research and extension in the project area. This paper briefly describes the steps the FSIP team has taken to link and mold researchers, extension agents and farmers into an expanded team to identify and solve production problems and improve family well-being. From project area entry to the establishment of the first 54 on-farm trials, the paper reports how the FSIP team kept farmers, extension staff and local authorities involved so that they too "owned" a part of the problem and participated actively in finding and implementing the solutions. The paper further portrays the evolving drama of institutionalizing FSR/E in the existing research and extension systems without creating an artificial structure that would end with the termination of the project.

THE SETTING

Rwanda is a tiny landlocked country with an estimated area of 26,338 km^2 and a population of nearly 6 million people, 231/km^2. The FSIP is located in Rwanda's North Central highlands where population density exceeds 500 persons/km^2. Population increases at over 3%/year.

Ninety-five percent of the population is engaged in farming. Until recently, food production has kept pace with population growth by bringing more land under cultivation. Current land shortages and declining soil fertility have now made it imperative to increase production per unit of land and to introduce fertility management and soil erosion control measures.

The project area is characterized by a series of sharply defined hills with steep slopes and flat ridges intersected by deep valleys with sometimes very large marshy plains at the bottoms. The altitude ranges from 1600 to 2650 m with most of the land above 2000 m. Area temperatures average 17 C with only slight daily fluctuation. Temperatures vary considerably, however, according to altitude. Annual rainfall ranges from 1100 to 1650 mm with a bimodal distribution. There are three main soil associations. Altitude, temperature and soil and rainfall variations provide a number of micro-climates, which influence cropping and livestock systems significantly. The team estimates that there are at least nine micro-climatic zones, based on altitude and soil association (Yamoah, 1985). Cropping systems that include 5 to 6 important crops and several crop associations further complicate farming systems research (Paul and Bizimana, 1985).

There are over 30,000 farm households in the project's four communes. The average family of five persons owns about 1 ha of land. Their land holdings are fragmented due to the traditional system of inheritance, so most farms have small fields scattered at often great distances from the family "rugo," or dwelling. The dispersed settlement pattern of family units, the near absence of villages and the fragmentation of land add to the complexity of appropriate interventions (Franzel et al., 1985).

The project area lies in the Ruhengeri Prefecture, one of Rwanda's 10 administrative subdivisions. The prefecture consists of 16 communes, four of which were assigned to the project as its zone of action. Each commune is sub-divided into sectors and these in turn into cells, as depicted in Table 1. These communes cover a land area of over 603 km^2

Within the administrative structure, the commune is the basic unit of development. The Commune's chief administrators are the bourgmestres. Bourgmestres with their councilors and heads of cells are responsible for agricultural development as well as for the political and social development of the community. These people, along with the communal agricultural extension officers (agronomes) and agricultural monitors (monagris), represent the gate to the local community for conducting farming systems research and extension.

The agricultural extension system is linked to both the political administrative structure and the Ministry of Agriculture as depicted in Fig. 1. For the most part, the agronomes and monagris are involved in "extending" national agricultural policy "themes." The general flow of communications is from the ministry level to the prefectural agronome, from there to the sub-prefectural and communal agronomes and then to bourgmestres, sectoral councilors, monagris and cell officials. Finally the theme reaches progressive farmers and others (Grosz, 1986). In fact, the extension service serves to enforce the national will with the power to dispense and collect fines for infractions of national agricultural policy. This weakens the effectiveness of extension efforts and stifles communication from farmer to policy makers at the national level. National themes include erosion control, pit composting, use of manure and compost to maintain soil fertility, confinement of livestock, reforestation and family planning.

The extension service in the four communes is relatively understaffed. Its effectiveness is further hindered by the dispersed nature of the population. Agents often walk; a few ride bicycles. As Table 2 shows, there are seven communal agronomes (technical agriculture school graduates), nearly two per commune, and 25 monagris (little to no formal technical training). Each monagri is responsible for an average of two sectors. Given a population that now exceeds 175,000 persons and 5.2 persons/family, the ratio between families and monagris is approximately 1300 to 1.

The Institute for Scientific Agricultural Research (ISAR) is charged with principal responsibility for agricultural research in the country. The Institute historically conducted a research agenda that often lacked relevance to farmers' problems. It also lacked effective communication with the extension services and with the farmers who are expected to adopt "appropriate" technology generated by research. The impact of research on agricultural production despite 50 years of existence has not kept pace with Rwanda's needs and expectations. Thus, the Government of Rwanda (GOR) considered the restructuring of ISAR to be essential so that research would "truly serve stock-crop farmers by involving them, in some manner, in that research." (Nzamurambaho, 1983).

THE PROJECT AND ITS MISSION

In 1984 the Government of Rwanda requested USAID assistance in developing the FSR/E approach to strengthen ISAR's applied research capability and to effectively integrate all research and extension activities. Thus, in May 1985, the FSIP became a reality under a contract between USAID and the University of Arkansas. The FSIP was given a mandate to increase food production and to assist the GOR to institutionalize a farming systems approach to research and extension that included a mechanism for effectively linking research and extension institutions and their activities. To fulfill this mandate, the project was committed to:

- build an effective FSR/E team;
- develop and diffuse appropriate technologies to increase food production;
- develop skills and understanding of Rwandan researchers and extension agents to conduct on-farm research and extension;
- complete research studies;
- develop data bases;
- develop linkages with IARC's;
- provide rural infrastructure to gain community support in the four communes.

The Rwandan Government pledged to complement the process through the provision of:

- Rwandan researchers and mid-level technicians;
- a Rwandan project director;
- an appropriate work site;
- a memorandum of understanding to establish formal relationships of the project (as a part of ISAR) with the local extension service (a part of MINAGRI);
- a coordinating committee to monitor project activities.

The GOR designated ISAR as the implementing agency for the FSIP project and ISAR's high aititude research station at Rwerere as the base of operations.

THE TEAM

The FSIP team at present consists of four foreign and two Rwandan researchers. The team still lacks two Rwandan researchers and seven mid-level technicians to bring the core team to full strength. Technical composition of the team is as follows:

- an agronomist;
- a soil scientist;
- a plant pathologist;
- an extension trainer;
- two agricultural economists, one the team leader.

Thirty-five person months of short-term technical assistance are included in the contract to back the team in addressing problems for which technical expertise is lacking.

SOME GUIDING PRINCIPLES

As a part of the team building process, the team hammered out the methodology that would be followed for entering the project area and for conducting farming systems research and extension. The following principles resulted from their discussions:

1. Diagnostics and on-farm research are key tools of farming systems research and extension. These tools provide a basis for making national research programs relevant to meet the basic needs of farmers. Extension provides the essential linkage between the researcher and the farmer. Appropriate extension not only extends "appropriate technology" but also insures farmer involvement in the entire process, from problem diagnosis to participation in on-farm testing of plausible interventions.
2. An artificial or parallel system should not be created. Rather, on-farm research and extension should be conducted within the framework of the existing institutions. The question constantly before us has been, "What can we do that will remain when we leave?"
3. On-farm trials provide an important means of farmer and extension agent involvement and should begin as soon as possible.

THE STRATEGY

Following their September 1986 arrival, the team focused on establishing the first on-farm trials in "B" season (which started in March 1986). All the necessary elements for meeting this goal, such as team building, area entry, diagnostics, selection of interventions, farmer selection and planning experiments, were adjusted in time and scope to meet this biological "window."

The team further insisted on interventions that addressed constraints farmers identified during the diagnostic surveys (Murekezi, 1986). For the initial on-farm research, the team chose bean trials to study disease resistance and sweet potato trials to study the adaptability of known shorter-season sweet potato cultivars to high-altitude conditions. Multi-locational trials would be used to study the life cycle of *Acraea acerata*, tent caterpillars, which defoliate sweet potatoes. The trials would also be used to investigate mulch and alley cropping systems and to address soil fertility and erosion control problems. Trials were to be simple in design and have a reasonable chance of success. The number of interventions would be few and the number of farmers limited in order to do well what we set out to do. We needed the opportunity to learn on the job without too high a cost (Rawson et al, 1986).

The team quickly realized that they could not meet the deadlines with only the existing core staff. Implementing the area entry plan required close collaboration with the local extension system. Furthermore, selection of appropriate interventions depended on interaction with on-station researchers. We therefore decided to expand our concept of the FSR/E team to include both on-station researchers and local extension agents, as depicted in Fig. 2. Through improved communications and involvement in research activities, we would strive to link farmer, researcher and extension agent as partners in an effective FSR/E team. Training would begin early. Those involved in this expanded team would need an awareness of the project's goals and objectives along with an understanding of FSR/E concepts and methods. Installing and monitoring on-farm trials would require improved technical skills.

ACTIVITIES BUILDING TOWARD AN EFFECTIVE FSR/E TEAM

Team Building

Part of the process of institutionalization involved "entering" the project area in a coordinated and positive manner. Planning together as a team how to enter the project area was strategic to project success. The FSR/E team needed to learn to work together and to formulate common goals and objectives and an approach to the milieu. Methods and concepts of FSR/E needed refinement. The team needed a common understanding of the project area, its resources and limitations.

Activities of a "team-building" nature have included: developing a plan for entering the project area; discussing team roles and responsibilities; developing a project work plan; creating a public relations project summary in French and Kinyarwanda; researching and discussing secondary information on the project area with the development of area profiles; visiting other projects together as a team: explaining the project to local administrators and extension agents; interacting with local officials and extension cadre on constraints they face in improving agricultural production; holding field days for on-farm trials; and training of extension agents on how to monitor trials.

The team participated in other, more structured training events such as a practice session for installing bean variety trials and a work session to review and improve the team's diagnostic survey procedures. Workshops and conferences conducted by CIMMYT and FSSP provided a forum in which the team could refine concepts and methods of FSR/E. Project-sponsored scholarships to some of these events have included individuals other than core team, such as station researchers and extension agents.

Involving Extension

Since FSIP has only begun its field activities, the project has concentrated on research, which has yet to produce proven extendable interventions. This has not hindered us from involving the extension system. The role of extension during this phase is to work alongside researchers and farmers, functioning as gatekeeper and communications linkage, helping to insure the needed multidirectional flow of information from farmer to the researcher and back.

Despite a lack of formal agreement delineating how we are to work together, the administrative and agricultural extension agents in the project's communes have cooperated with us to:

- identify priority work-related constraints to doing agricultural extension in the project area;
- choose farmers for our diagnostic survey;
- explain the project to farmers during the diagnostic survey;
- conduct the diagnostic survey;
- improve our diagnostic methods;
- select farmers for our on-farm trials;
- explain FSR/E methodology to farmers;
- install researcher-managed bean and sweet potato variety trials;
- select communal and institutional sites for adaptive research trials;
- provide "umuganda" labor (donated labor required by government one day per week) for trial site land preparation;
- monitor on-farm research trials;
- conduct farmer field days to evaluate bean variety research;
- conduct farmer field days on cover crops and agro-forestry research in progress.

During a series of diagnostic interviews, extension agents identified four major problems that the project is attempting to address:

(1) lack of technical skills,
(2) too few agents to do the job well,
(3) lack of mobility and
(4) lack of basic extension and office materials.

A training program is in progress to build the agents' effective capacity to assist with farming systems research and extension. Training topics have included project goals and objectives, FSR/E concepts and methods with a focus on the research activities in progress such as diagnostics methods, layout of trial

plots and the purpose of the research. The team conducted a three-day workshop on bean disease and insect identification and control in cooperation with specialists from ISAR and the International Center for Tropical Agriculture (CIAT). One output of related field work assignments provided an inventory of bean diseases and pests in the project area. The extension agents also developed a descriptive list of bean diseases in Kinyarwanda to be used in future training events.

We have worked with each communal agricultural office to program our work into their busy schedules to avoid scheduling conflicts. In addition, the project has hired additional agents to alleviate the work load. These agents will be fully integrated into the communes in which they work. The project intends to address their mobility problem through provision of a means to obtain bicycles and motorcycles. Limited basic office supplies and field materials will also be provided to increase their effectiveness.

Farmers as Partners

Area farmers are important partners in the research process. They were initially interviewed to help determine resource levels, problems and concerns. Their collective contribution helped to establish research priorities, including soil fertility and erosion control research as well as bean and sweet potato variety research. Their participation in trial monitoring is solicited, and their evaluation of trial results is critical to our continued operation.

Typical of the interaction between farmer and researcher is the observation by the women planting our bean plots that we planted too thickly, especially for the climbing variety. During first round monitoring, one of our agronomists took plant counts from trial plots and the farmers' bean fields that surrounded our plots. The farmers helped him count. Farmers' fields had a density 100,000 plants/ha higher than our trial plots. This information was shared with each farmer on the spot. Similar interaction took place with the farmers regarding sweet potato trials. Women observed that our ridging methods would produce bigger potatoes but planting flat as they do would produce higher yields. Harvest time will tell who is right. We already know that the women, who do all the work in sweet potato production, are not favorably impressed with the additional work required to ridge the plantings.

Field days for farmer training and interaction have been organized both at planting and harvest time in each of the four communes. We have shared our philosophy and methodology with farmers. Harvest field days provided a forum for evaluating results and for planning ahead to the next season. The acid test is when a farmer wants to continue the exercise, even though the trial results of a particular season are not too promising. Farmers helped us determine, for example, that our bean trials were planted early for some micro-climates. Their beans, planted two weeks later, were not as hard hit by bean diseases. Whether their bean yields will be influenced by late-season aphids and dry weather awaits the after-harvest trial results. Even with the quite variable results of this season's trials, the farmers still want to cooperate for another season. They also know that we value their input.

We brought 35 farmers with their agricultural extension agents to Rwerere for a field day on soil fertility management and erosion control. These farmers had never set foot on a research station before. The group visited plots established by our soil scientist for cover crops and leguminous shrubs. The purpose of the research was discussed and the results evaluated together with the farmers. It was hoped from this experience that a few of the farmers might be willing to farm test these interventions. Before the end of the day, they all begged to cooperate. They decided among themselves that they would team up for both the cover crop and alley cropping trials.

Including Station Researchers

ISAR researchers at both Rwerere and Rubona have been very supportive of our work, both in defending its existence and providing technical backstopping where needed. Bean researchers at Rwerere and Rubona (including specialists from CIAT) helped conduct the bean disease and insect pest workshops for extension agents. Station researchers also provided recommendations for varieties to be used in bean and sweet potato variety trials.

The project, in turn, is beginning to generate information needed as feedback for the researchers to modify or reinforce their station research activities. Furthermore, the project is providing the station researchers with opportunities to interact with both farmers and extension agents. This strengthens information flow and increases the likelihood that station-based research activities will be relevant to address farmers' needs.

Establishing Formal Linkages

Formal recognition and establishing proper communications with national and local authorities are basic to project success. Official presence involves both formal agreements and information linkages. Formal agreements specify working relationships and responsibilities of all parties within the framework of the project. Information linkages provide a basis for dialogue on issues and for feedback essential for evaluation and adjustment to improve project effectiveness.

The FSIP team has a positive official presence. The team met with ministerial, prefectural and communal authorities for formal introductions and to explain the project purpose and proposed work plans. Two-day dialogue on issues and responsibilities is evolving. Local administrators and agricultural technicians are anxious to assist with project implementation. Communal agricultural agents working with the project do so based on good will and informal arrangements. Feedback from the official community is assisting the team to evaluate and adjust for improved effectiveness.

The project still lacks memoranda of understanding that establish the formal relationship of the project with the local extension agents and provide for a coordinating committee to monitor project activities. Misunderstandings about the purpose of the project have surfaced as a result. Many officials hold the expectation that FSIP should be an integrated rural development project with an emphasis on infrastructure. There is another expectation based on interpretation of certain phrases in the project paper that the project will take on full financial support of the extension service in the four communes along with their work programs. This is particularly interesting to local authorities, since many of the communes are having financial difficulties and are subsequently laying off extension agents.

IT'S NOT AN EASY ROAD

While the project has had a measure of success in building an effective relationship between research and extension, it has not been an easy road, nor will it be. The current level of success is built on a lot of good will, and perhaps on anticipation of "better things to come." Being a relatively large agricultural project generates high expectations about what all that money can and should do. Some well-placed government officials have said that it seems a waste to spend all that money on "research." As badly as formal working arrangements need to be spelled out, there continues to be substantial disagreement on the substance of the accords and how our funds should be managed.

The questions are myriad, new territory unscouted, tolerances often low and resistance to change sometimes high. There are no handbooks or maps to help steer a course through the mine fields of institutional change. We currently face the serious question of whether or not the project should take over all on-going extension activities and themes as well as all extension staff. Can we physically and financially do so without jeopardizing our commitment to FSR/E? We do not believe we can. If not, what can we do for extension more than is now being done to make it a more effective service for disseminating tested interventions coming out of the FSR/E process? Is training and involvement in the on-farm research enough? Is the supply of more agents, better transport and logistical support the answer? Should we take on some existing themes? Or will current extension themes conflict with technologies or recommendations that will soon come out of the FSR/E process?

CONCLUSION

These and other questions point to challenging days ahead for the project. Much progress has been made already in institutionalizing the FSR/E process in the project area. Approximately 120 farmers and their extension agents are participating actively in various phases of on-farm research. For the first time farmers are able to communicate directly with researchers to influence the relevance of on-station as well as on-farm research. A new three-way partnership of farmers, researchers and extension agents is evolving. Elements of the top-down structure of enforcement will sometimes inhibit useful two-way information flows until the problem is addressed by national policy. Misunderstanding of project goals and objectives will surface until appropriate accords formally spell out working relationships. A great opportunity is before us. There is much work to be done.

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Table 1. Civil Subdivisions of the Project Area.

Communes	Sectors	Cells
Butaro	10	53
Cyeru	15	47
Nyamugali	12	36
Nyarutovu	12	53

Table 2. Number of Extension Personnel by Commune.

	Butaro	Cyeru	Nyamugali	Nyarutovu
Agronomes	1	2	2	2
Monagris	7	6	4	8
Sectors	10	15	12	12

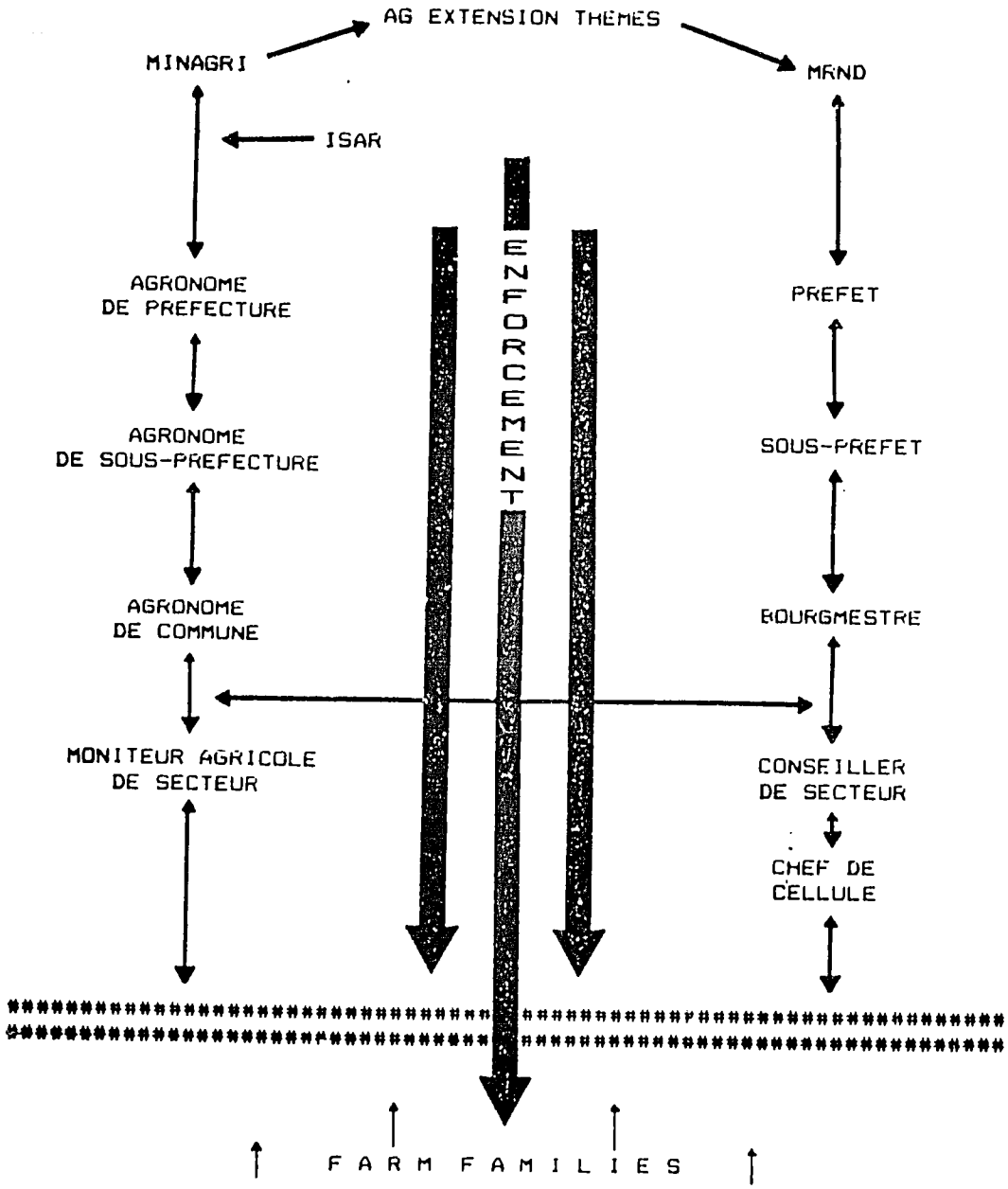

Fig. 1. Rwanda's existing research and extension structure.

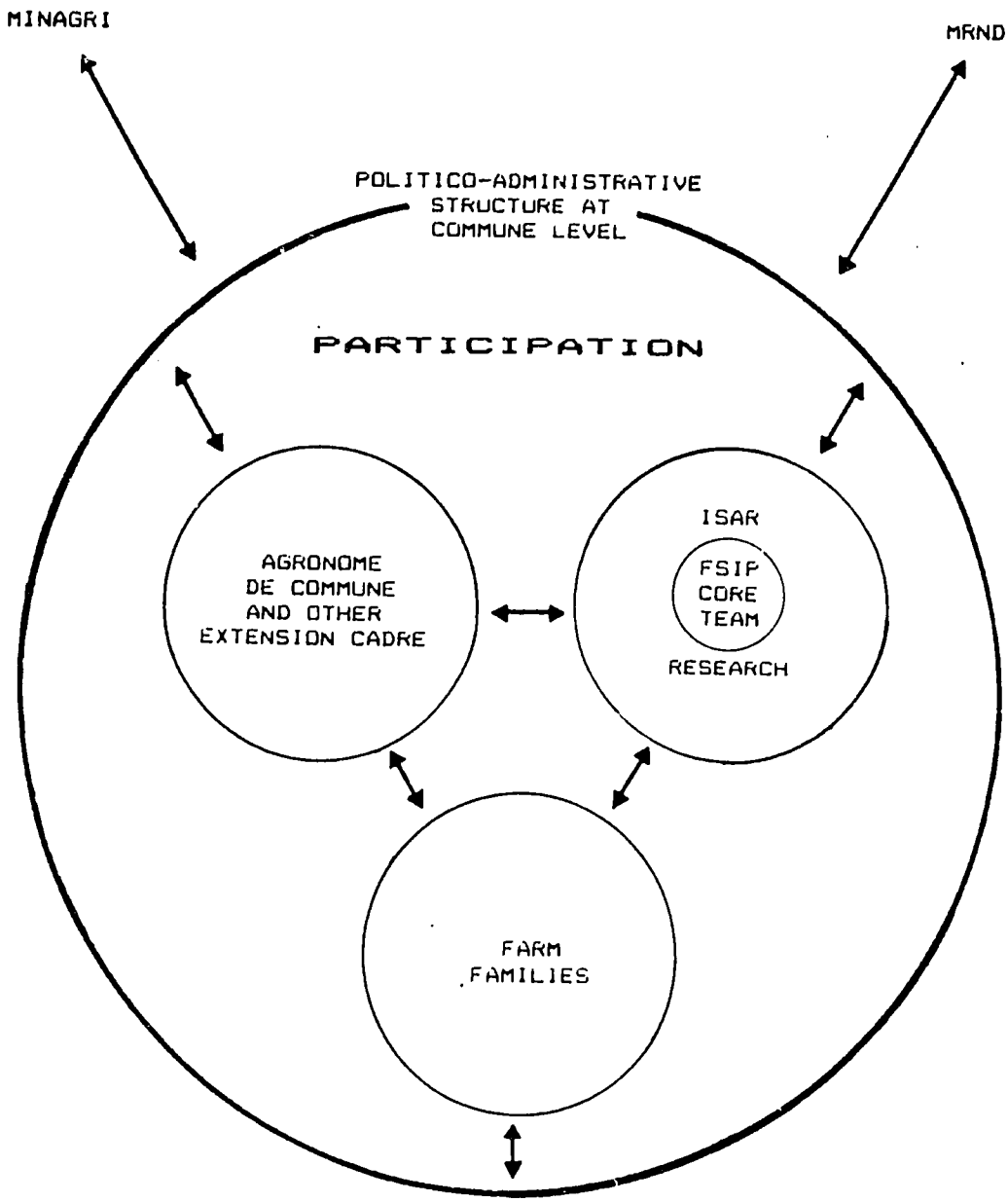

Fig. 2. Improved research and extension structure: the expanded team.