FSRE

Number 3, 1989
The third in a Series of Four

Farming Systems Research-Extension Newsletter

Ninth Annual International FSRE Symposium: "Impacts of Farming Systems Research-Extension on Sustainable Agriculture"

From October 8 through 11, 1989, more than 300 persons from over forty-five countries participated in the 1989 International Farming Systems Research-Extension Symposium hosted by the University of Arkansas and Winrock International Institute for Agricultural Development. This symposium was sponsored by the Ford Foundation, the United States Department of Agriculture, and the United States Agency for International Development. Conference themes included: 1) FSRE and the concepts of sustainability; 2) the role of farming systems in sustaining productivity and profitability, farmer participation in agricultural development, institutional development, and environmental quality; and 3) special topics. The Arkansas/Oklahoma Low Input and Sustainable Agriculture (LISA) Network Conference was held just prior to the symposium along with several short courses focusing on skills related to farmer participation research and sustainable agriculture.

To address the special regional concerns of developing countries and provide a forum for the growing interest in farming systems in the United States, the first full day of the symposium (October 9) was organized around concurrent sessions with a regional focus on Africa, Asia/Near East, Latin America, and the United States. The keynote address was provided by Dr. Mohan Mon Sainju, the Royal Kingdom of Nepal Ambassador to the U.S. (see below). Following the concurrent sessions, a panel presentation entitled "Making Sustainable Agriculture an Effective Tool for International Development" was provided. The major speakers on the panel included Dr. John Ragland from BIFAD, Dr. Thurman Grove from USAID, Dr. Clive Edwards from Title XII, and Dr. Richard Harwood from Winrock International Institute for Agricultural Development.

Highlights from the second and third day of the symposium included plenary addresses given by Dr. Charles Francis and Dr. Peter Hildebrand on "FSRE and the Concepts of Sustainability," Dr. Jacqueline Ashby on "Farmer Participation in Agricultural Development," Dr. Obdulia F. Sisson on "Institutional Development," and Dr. David Groenfeldt on "Environmental Quality." Concurrent global sessions followed these presentations.

Over one-hundred research papers were presented, nearly twenty percent by women, representing the importance of the involvement of women in agriculture. In addition, a large collection of posters and promotional materials displayed activities being carried out by organizations and individuals committed to the FSRE methodology around the world.

An important event that occurred at this symposium was the formation of an Association for Farming Systems Research-Extension (AFSRE). This association consists of a broad-based and multidisciplinary group of FSRE practitioners. The primary activities of the AFSRE are to provide continued support for the Farming Systems Symposium, to publish a farming systems journal, and to distribute a farming systems newsletter to members throughout the world.

In This Issue

An international society organized to promote the development and dissemination of methods and results of participatory on-farm systems research and extension. The objective of such research is the development and adoption through the participation by farm household members—male and female—of improved and appropriate technologies to meet the socioeconomic needs of farm families; adequately supply global food, feed, and fiber requirements; and utilize resources in a sustainable and efficient manner.

On behalf of the association, we wish to thank the University of Arkansas/Winrock FSRE Symposium Coordinating Staff for the excellent job they have done in hosting the symposium for the past three years. In particular, we wish to acknowledge the efforts of Dr. Tom Westing, Dr. Donald Voth, Ms. Beth Barham, Ms. Pamela Styles, Ms. Nancy Christman, and Dr. Robert Hudgens. The success of this year's symposium is largely due to their contribution. Further symposia will be held for the next few years at Michigan State University.

COMMENTS ON THE ASSOCIATION FROM THE PRESIDENT

by
Peter Hildebrand
President of AFSRE
University of Florida

The Association for Farming Systems Research-Extension, AFSRE, was created in a plenary session of the ninth annual International Farming Systems Symposium held at the University of Arkansas in October 1989. The creation of the Association followed two years of work by two ad hoc committees. The first was chaired by Steve Kearl who is currently working on a project in Cameroon. It was established in 1987 to continue the network created as a result of the U.S. Agency for International Development-funded Farming Systems Support Project, FSSP, and related efforts from other donors around the world. It was replaced by the second ad hoc committee in 1988, which was chaired by George Axinn, who is currently the Food and Agriculture Organization representative in India. It worked towards the creation of an association to serve the needs of farming systems practitioners working around the world and to continue to support the international symposium.

The association is an international society organized to promote the development and dissemination of methods and results of participatory on-farm systems research and extension. The objective of such research is the development and adoption, through the participation by both male and female farm household members, of improved and appropriate technologies. Such technologies will meet the socio-economic needs of farm families; adequately supply global food and fiber requirements; and utilize resources in a sustainable and efficient manner.

One of the primary activities of the association will be to continue supporting the International Farming Systems Symposium. After six annual meetings at Kansas State University and three at the University of Arkansas, future symposia will be held for the next few years at Michigan State University. Announcements and a call for papers will appear in the next issue of this newsletter.

This *FSRE Newsletter* is the third in a series of four sponsored by the first ad hoc committee and is the first supported by the AFSRE. The next jointly published newsletter will be distributed to the full FSSP mailing list of about 5,000 persons. Subsequent newsletters will be sent only to members of the AFSRE. Therefore, if you wish to continue receiving this newsletter, you will need to join the Association. Membership information is included on page 16 of this newsletter.

The AFSRE will also publish the *Journal of Farming Systems Research-Extension*. Initially, the journal will include those papers presented at the symposium, which will be peer-selected and reviewed for publication. The first issue is in progress and should be available by mid-February. Three issues are planned for 1990. Those who participated in the 1989 symposium, as well as association members and institutional subscribers, will receive copies. Beginning next year, only AFSRE members and institutional subscribers will receive the journal.

A directory of members will be maintained. This directory will allow sorting for special mailings or notification of selected members of announcements of interest to them.

Officers elected at Arkansas are: President, Peter Hildebrand, Florida, USA; President-elect, Harold McArthur, Hawaii, USA; and Secretary/Treasurer, Tim Finan, Arizona, USA. Board members with specific charges are: Editor, Tim Frankenberger, Arizona, USA; Membership, Noel Young, Kansas, USA; Networking, Virgilio Carangal, Philippines; Fund Raising, Robert Hudgens, Arkansas, USA; and Nominations/Elections, Hilary Feldstein, New Hampshire, USA. Board members at large are: Jacques Faye, Burkina Faso; David Gibbon, Netherlands; Nimal Ranaweera, Sri Lanka; German Escobar, Uruguay; Don Voth, USA; and Nancy Axinn, India. Co-chairs of the 1990 Symposium are James Bingen and Dale Harpstead from Michigan State University and Harold McArthur, President-elect of the AFSRE.

The creation of the Association has resulted in a great deal of excitement. We look forward to a large and active membership. Please use the membership form in this newsletter or a copy of it to become a member. You may also wish to provide copies to friends and colleagues who may be interested in learning more about AFSRE. We hope to see many of you at the symposium next year.

KEYNOTE ADDRESS PRESENTED AT THE 1989 FSRE SYMPOSIUM

by
Dr. Mohan Man Sainju
Nepalese Ambassador to the United States[a]

The last five decades have seen many positive changes. Not only have most of the countries of the third world emerged out of various forms of colonialism and isolation in the pursuit of nation building, but many of them have been able to undertake development programs in order to improve the living standard of their people. Consequently, some countries in the developing world have made extraordinary strides and have emerged as newly industrialized countries. With the help of developed countries and multilateral institutions, production technologies have been developed and improved. If macro figures are any indication, there should and could not be food problems in the world. There are documented instances where the "green revolution" has changed the status of a country from one of food starvation and low production to one of food surplus.

The history of development has also shown its painful side over these decades. There are more poor people than ever before on the planet today. Despite all the development plans and the billions of dollars spent in the name of development, the majority of people in the developing world are still outside of the mainstream of the development process. The least developed countries, especially those which are land-locked, are poorer today than they were a decade ago despite the adoption by the international community of the Substantial New Programme of Action for the Eighties. Meeting the bare minimum needs is still a dream for millions of people who live below the poverty line. The gap between the rich and the poor, instead of narrowing, is widening, and this process seems to accelerate with the help of science and technology. Countries which had experienced some success have had reverses in their economies. The eighties is witnessing increasing flow of resources from developing countries to the developed ones, instead of the other way around.

There are several reasons that explain what and where things went wrong. Many of the donor countries and multi-lateral organizations, such as the World Bank, devoted much more attention to the macro economic situation and became bogged down in standard economic analyses. The person, who was supposed to be the central focus, was replaced by statistics. Happily, this situation is gradually changing for the better.[b]

Rural development strategy emerged as a new and innovative concept that shifted the focus of development efforts toward rural people and especially toward small holders whose productivity and efficiency had previously not been well recognized. This well-intended strategy also failed in many instances, primarily due to lack of political will and a committed bureaucracy. Similarly, the need for institutional change in agriculture did not result in its implementation. Because ownership of land in most developing countries is usually skewed, large numbers of farmers are still outside the mainstream of development benefits. The man behind the plough is the most neglected person in the rural societies of third world countries. Hence, the distribution of farm income is likely to be even more skewed.

It is true that technological advances and innovations have been instrumental in bringing positive change in agricultural production. At a time when there is a limit to arable land, the role of technological change undoubtedly plays an important role in agricultural development. However, it should not be forgotten that these changes entail a complex process that ranges not only from traditional to scientific farming, but also involve a complex web of biological and socioeconomic interactions. For these reasons, we must work ***with*** farmers and not work ***for*** them. Many of the agricultural development strategies in the past missed that point: farmers were expected to learn from research stations, yet agricultural scientists worked for them in isolation.

Agricultural development strategies in the past also overlooked women. Despite the fact that women constituted 78 percent of the African and 71 percent of the Asian agricultural workforce, they were rarely involved in training, extension, or research programs. The studies and evidence assembled clearly suggest that women must become a primary focus in order to enhance agricultural output and to alleviate rural poverty. There is substantial evidence that suggests that women's participation is not only critical in increasing farm production, but that their involvement and income directly support household budgets and promote child nutritional status. Other research indicates that in times of economic crisis women's income has played an important role in rural families.

In a nutshell, what went wrong was this: We simply did not recognize our mistakes and did not learn from the past mistakes.

Agriculture is and will remain, for many decades to come, the backbone of the economies in both Asia and Africa. In many developing

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[a] *Paper presented on October 9, 1989, at the Farming Systems Research and Extension Symposium, which was jointly sponsored by Winrock International and the University of Arkansas.*

[b] *See the World Bank President's speech to the Joint Annual Meeting of the World Bank and the International Monetary Fund on September 26, 1989.*

countries it is still a major source of employment and a critical contributor to gross domestic products. The agricultural sector has been the principal source of foreign exchange earnings for many countries and without its success, economic development, including industrial growth, is not conceivable. Despite the increasing growth of urban areas, many people will continue to live in the rural areas of Asia and Africa in the years to come.

The challenge that the global economy faces today is clear: accelerate growth and reduce poverty. This challenge cannot be faced without giving high importance to the agricultural sector. Agricultural development not only includes technological changes to increase farm output, but also focuses on the person who will be treated as the central element of the development process. Hence, improvement in the quality of life for millions of poor people becomes the real challenge.

Farming systems research has experienced increasing emphasis for some time. It represents a significant change in the agricultural development scene because it develops a linkage between research and its various clients. It is anticipated that through such a linkage researchers would have better information relating to farmers' conditions and needs. It is hoped that through interaction with farmers, new technologies can be tested, adapted, and finally put into practice. The experiences gained and the examination of results can be very important not only to refine concepts but also to strengthen the strategy for more effective results. This is precisely what is expected from an international symposium such as this one. The only request I would make to this august gathering is this: Please examine farming systems research and extension from a wider perspective without losing sight of the ultimate objective it is supposed to attain. Please allow me to examine a few issues to which we need to pay attention.

Any strategy for agricultural development has to focus on small holders and poor farmers. Ways must be found to increase farm output for these farmers. There are several instances of international cooperation that highlight the feasibility of working with the rural poor and small holders to increase farm output and reduce poverty. How these success stories should be related to farming systems research and extension is the question agricultural scientists and socioeconomic experts need to address.

The sustainability of agriculture is also a critical issue today. We must find techniques that can help increase farm output without necessarily increasing the use of chemical inputs and engineering investments. Increasing population pressure is forcing small farmers to turn to marginal land for cultivation, which in turn increases the possibility of natural resource degradation. Farming systems research can contribute by setting priorities and developing a wide range of technological options that respond to farmers' needs. The experience of, and techniques adopted by, permaculture are one small example to consider as a model.

As has been discussed, the importance of women in agriculture must be recognized. They have considerable potential for both increasing farm output and, more importantly, contributing to the socioeconomic uplift of families in rural areas.

Institutional change in the agricultural sector in the form of agrarian reform needs to be given due emphasis, so that small holders and small farmers receive due incentives for increased farm output.

The effective implementation of the farming systems research strategy is difficult to perceive without decentralization, which helps build institutional capability at the local level. Hence, whereas on the one hand there needs to be institutional linkage between farming systems research and national research structures, there is an urgent need to let the local level accept and effectively carry out new functions and responsibilities.

The impact of farming systems research primarily depends on several factors:

1. If farming systems research is to be effective in creating impact, the data it generates must be reliable. Therefore, the caliber of researchers must be an important factor. There may be occasions when researchers deal with increased variables, which may be less controllable, and hence critical judgement may be necessary.

2. Farming systems research is normally carried out by an interdisciplinary team of people. Sometimes there is a tendency to place them into one division or one organizational setup that may seem convenient and functionally easier. However, experience suggests this approach is not healthy for the effectiveness of the strategy. In other words, various disciplines must be encouraged to work within the team without being compartmentalized into one administrative setting.

3. The lack of strong linkages to the extension system has been one of the weaknesses of farming systems research. The impact of farming systems research is doomed to be poor if researchers are not intimately familiar with farmers' problems. Similarly, production programs cannot be extended unless research is intimately related to extension work.

4. The concept of the holistic approach as an important element of farming systems research has yet to be seen at an impact level. The holistic approach allows the system to deal with technical, biological, socioeconomic, and institutional aspects of agricultural production. The challenge is getting extension

personnel to appreciate a holistic approach and utilize results in production programs.

In conclusion, I would like to state that I believe farming systems research and extension is indeed a desirable strategy, which still needs to be rigorously operationalized. First and foremost, it requires change in the attitude of scientists and extension experts. They need to accept that this strategy demands them to look beyond the parochialism of their disciplines and keep themselves open to the immense knowledge that exists around them. To quote one of the agricultural scientists who worked for a number of years in the developing world trying to help and advise governments and scientists in improving agricultural output: "Perhaps the best lesson to learn is to listen to farmers, learn their problems, needs, and goals and then work with farmers on their fields to improve technologies, to achieve their perceived objectives, [and] not what scientists and extensionists think they need."

1990 FARMING SYSTEMS RESEARCH AND EXTENSION SYMPOSIUM ROLE OF FARMERS IN FSRE

The 1990 Symposium, hosted by Michigan State University (MSU), will celebrate two important milestones. It marks the tenth anniversary of the Farming Systems Research-Extension Symposium (FSRE) and celebrates the first birthday of the new Association for Farming Systems Research-Extension (AFSRE).

The program committee is working hard to design a meeting format that will provide a framework for challenging dialogue and discussion, and allow ample time for important collegial interaction. The provisional theme, *Role of Farmers in FSRE*, should generate some thought-provoking presentations and interesting panel discussions.

Following many of the suggestions offered by those who attended the first AFSRE meeting in Arkansas, the 1990 Symposium will be organized around a series of invited papers and panel presentations, and an expanded schedule of abstracted poster sessions. A call for papers will be announced by February 1990. Depending on the subject matter, certain papers will be designated for oral presentation and others for poster sessions. Whether presented orally or in a poster session, all completed papers may be submitted for consideration for publication in the new AFSRE publication, *Journal of Farming Systems Research-Extension*.

Within the scope of the general theme, the symposium organizers hope to identify issues that are relevant to FSRE activities in the various regions of the world and to the emerging Low-Input Sustainable Agriculture (LISA) research programs in the United States. Topics for possible panel session include:

Farmers as a Source of Indigenous Knowledge;

Role of Farmer Organizations in FSRE;

Farmers and the Management of On-Farm Research;

Role of Farmers in the Design and Evaluation of On-Farm Research;and

Farmer-Based Methodologies.

Sessions will be organized around key topics and issues, rather than by region, in an effort to foster increased cross-regional dialogue. The program committee is currently soliciting suggestions for panels and panel heads. If you have any ideas or are interested in organizing and chairing a panel or offering a pre- or post-symposium workshop, please contact the program committee by February 1, 1990.

The committee is also looking for suggestions for a special presentation that would commemorate the tenth anniversary of the symposium. Initial ideas include a brief analysis of symposia from 1981 to 1989, including participants and range of topics and issues addressed. A tentative title might be "The FSRE Symposium Over the Years: What's Been Covered and What's Still With Us."

Ideas and suggestions are welcomed, particularly from individuals who have attended all of the previous meetings at Kansas State University and the University of Arkansas.

The 1990 Symposium will be held in East Lansing, Michigan, October 14-17 at the University Place Holiday Inn and the MSU Union, which is located nearby. Additional rooms have also been reserved at the University Inn. Room reservations and conference registration forms will be distributed by Michigan State University shortly after January 1, 1990. Participants who will be arriving by plane should be ticketed to either Lansing or Detroit, Michigan. It is about an hour and 30 minute drive from Detroit to the MSU campus. Significant discounts for airfare on Northwest Airlines can be obtained through Anderson International Travel. Symposium attendees can receive 5% off of supersaver fares and 40% off of coach class fares.

More detailed information on travel and the symposium program will be distributed by direct mailings and in the next issue of the *FSRE Newsletter*.

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FARMING SYSTEMS RESEARCH-EXTENSION AND THE CONCEPTS OF SUSTAINABILITY[a]

by
Charles A. Francis[b]
and
Peter E. Hildebrand[c]

Abstract

Farming Systems Research and Extension (FSRE) has strongly influenced the direction of agricultural development over the past two decades. Involving farmers, change agents, and researchers, this participatory approach to technological improvement has evolved as an efficient means to develop individual components and more integrated systems that are uniquely suited to specific biophysical and socioeconomic conditions. Farmers under similar conditions, and for whom specific recommendations are appropriate, are grouped in FSRE into identifiable Recommendation Domains. The technologies recommended conform with the biophysical and socioeconomic constraints that create environments within the domains, based on the philosophy that ***new technologies must conform with the environments*** where they will be used, because most farmers are unable to modify their environments to meet the needs of new technologies. This characteristic differentiates FSRE from the approach of developing ***conventional technologies to dominate environments*** through use of machinery, chemicals, irrigation, and other capital-intensive inputs.

The philosophy of sustainable agriculture is gaining ground in a world becoming acutely aware of finite fossil fuel resources and adverse impacts of agriculture and other industries on the environment. In spite of substantial advances in productivity through applications of fertilizers, pesticides, and irrigation, we are learning that inappropriate or excessive use of these inputs can have unexpected and undesirable effects on the environment, natural ecosystems, and the world's human inhabitants. In order to develop the systems that will provide for our needs without endangering the quality of life of future generations, we must concentrate on an efficient use of renewable resources that are available within the immediate production environment. We need to reduce fossil fuel use to minimum essential levels. We must develop technologies that conform more closely with the environments where they will be used. The urgency associated with coming to grips with the problem is becoming more evident every day. These necessities precisely coincide with the capabilities of the FSRE approach.

FSRE practitioners work with families who live on the land and are acutely aware of their surrounding environments and how they are influenced by farming practices and systems. Because farmers participate in the development and testing of alternatives, their evaluation criteria will be used for screening. These may differ from the narrower and often misleading criteria used by researchers trained in specific disciplines. This aspect, in itself, enhances the efficiency and effectiveness of the technology development and adoption process. When the farmers' concerns and resource base are more explicitly taken into account, technologies thus developed are more readily adapted to the farmers' environments. Perhaps most important, FSRE on-farm research and technology evaluation methods have proven efficient for screening and selecting technologies that conform to the divergent environments found on farms throughout the world.

Introduction

Farming systems research and extension methods have been widely tested and applied over the past two decades in a range of ecological and economic circumstances. Client participatory and location-specific in nature, this approach has extended the methodological resources available to administrators in public institutions who are concerned with the application and credibility of recommendations derived from research. Holistic and interdisciplinary in its focus on total systems, FSRE takes into account the multiple goals of the farm family as well as the economic and resource situation in which the farm operates. When we consider the time dimension within which the family makes decisions and plans for the future, the long-term sustainability of production and profit become central to system design (Francis and Hildebrand, 1988).

There is little agreement about precisely what is meant by "sustainable agriculture." Growing concerns about the finite fossil fuel resource base upon which modern agriculture depends and about the quality of our environment bring new focus to the philosophy of sustainability. The perspective in which we are developing this philosophy was

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[a]*Presented at the ninth annual International Farming Systems Symposium, University of Arkansas, Fayetteville, October 8-11, 1989.*

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eloquently reviewed by Lockeretz (1988). Given the immediate and continuing needs of an expanding population for food, as well as concerns about resources and the environment, a definition given by Harwood (1988) seems appropriate:

...an agriculture that can evolve indefinitely toward greater human utility, greater efficiency of resource use and a balance with the environment that is favorable both to humans and to most other species.

The importance of the fusion of sustainable agriculture philosophy with the methods and experiences from farming systems research and extension is amply illustrated by the focus and topics of the 1989 International Farming Systems Research-Extension Symposium in Fayetteville. In addition to recurring themes of productivity, profitability, farmer participation, and institutional development, the papers this year reflected a clear priority on resource issues and environmental quality. This paper describes our current awareness of complex issues in agricultural development and how an emerging consensus on sustaining agricultural production is impacting the mainstream of research and extension.

FSRE Methodology and Sustainable Agriculture

The client participatory nature of FSRE enhances the capability of research and extension organizations to incorporate farmers' goals, resources, concerns with their own future, and their experience into the technology generation and diffusion processes. These characteristics all influence the production environments and the farming systems found on different farms. It is because of the diverse nature of these environments that technologies need also to be diverse. FSRE methodology has recognized this need — it is suitably expressed in the commonly used term, Recommendation Domain. In responding to the concerns for a more sustainable agriculture, more emphasis must be placed on developing genetic materials and farming practices that fit within biophyiscal and socio-economic environments of different farming systems. This will necessarily be based on a fuller understanding of these environments and on on-farm research to evaluate technology through environmental interactions. This in turn will depend on enhanced multidisciplinarity, another of the basic facets of FSRE methodology.

Sustainable agriculture will require augmented technological innovation and diversity. The development of a wider array of genetic materials and farming practices is encouraged by on-farm research and evaluation early in the technology development process. In this process, screening is usually initiated under controlled conditions where researchers feel they are better able to detect any differences in their treatments or materials. Acceptance and rejection at this stage determine which of the potential new technologies receive further evaluation and which are rejected. Because of environment-by-treatment interaction, treatments that respond well under controlled conditions (and usually in superior production environments) ***may*** not respond well under environments more representative of farmers' conditions. But also, and with potentially more serious effects, treatments that manifest less potential under the favorable conditions usually found on experiment stations, and are, therefore, rejected for further evaluation, ***may*** well be those which would be superior under real farm conditions. Hence, early evaluation of potential new technology on farms and under real farm conditions, a basic feature of the farming systems approach, can help assure more technological divesity and a more sustainable agriculture in the future.

As compared with conventional, capital-intensive agriculture, it is widely agreed that sustainable agriculture is more information- and management-intensive. For sustainable technology to be adopted, it will have to fit into the management capabilities of farm managers and within their resource base in each recommendation domain. Again, the multidisciplinary procedures used in the farming systems approach are appropriate to helping researchers and extension workers understand the capabilities of farmers in their research domains. Rapid reconnaissance surveys or "sondeos," a well known component of farming systems methodology, were developed to help understand farmers and their conditions. The participation of farmers and persons from several disciplines in on-farm research also helps in understanding farms and farmers.

The longer-term desires of society do not necessarily coincide with the short-term needs of individual farmers. Farmers are concerned with family survival and welfare, and may use practices and resources in a way that, from society's perspective, is non-sustainable. Farming systems methodology can contribute in two ways to help alleviate these conflicts. First, by understanding the needs of the family, practitioners are better able to develop technologies that satisfy farmers' needs while at the same time use scarce resources more efficiently. Secondly, policy makers can take advantage of the knowledge of farming systems teams to help devise policies more in harmony with society's needs and, at the same time, provide the appropriate policy incentives to encourage farmers to use more sustainable practices.

A more sustainable agriculture will not be achieved just because society desires it: means must be derived for efficiently achieving the diversity of location-specific tech-

nology necessary to support it. ***Farming systems methods are cost- and time-efficient*** in this regard. The conventional method for developing a new technology requires several years of evaluation and screening under controlled conditions before it is submitted to farm conditions. As explained above, after several years of testing, this process can result in

1) the selection of technology by researchers which does not do well under real conditions and is therefore rejected by farmers;

2) the rejection of technology by researchers because it did not perform well under controlled conditions, but which ***might*** have done well under real conditions; and

3) the release of a successful technology.

Designing and developing technology for well characterized socioeconomic and biophysical conditions, followed by early on-farm testing to minimize the rejection of useful technology, can reduce the time span from conception to adoption and increase the adoption success rate. Coupled with the fact that farmers supply a significant amount of research resources for on-farm research (Franzluebbers et al., 1988), FSRE is an efficient approach from both time and cost perspectives.

Sustainable Agriculture

Farming systems could be viewed on a time spectrum as having important past, present, and future dimensions. All that has occurred in past cropping seasons — choice and management of specific crop species, incorporation of animal or green manure, cropping intensity, soil conservation practices, climatic conditions — has predisposed a specific field as well as a farm with certain potential for productivity in the current year. Events of past farming seasons have contributed to the experience base that influences management in the current year. The dynamic cyclical and linear changes in one field could be called the "progressive biological sequencing" of practices and biological consequences that occur in that field as a result of a given management strategy (Francis et al., 1986). As the management of this one field influences practices in other parts of the farm, the interactions that take place are also managed by the astute operator; this could be called "integrative farm structuring" in that farming operation (Francis et al., 1986). This is the space and time continuum within which farmers operate and decisions are made.

Crop and animal patterns are based on family goals, land and other available resources, labor, and production potential of the farm. These are dimensions of the production system that are quantified or otherwise made explicit in the methodology of farming systems research and extension. Decisions made for the current year not only affect immediate farming success in terms of food, income, and profitability, they influence the potential for future productivity of the land. In a real way, past practices and current decisions determine to a large extent future sustainability.

How well the farm family can sustain production and profit into the future will depend on how well the goals for food and income can be reached within the short-term land, labor, and other resource constraints of the family. There may be trade-offs between short-term profits and long-term productivity, for example, in using all land for cash crops versus planting some areas in green manure crops and thereby providing nutrients for future crops. Choice of some sub-optimum crops in terms of immediate profits may lead to greater long-term productivity or sustained profit or less variation in family income. Families living too close to the edge of economic survival in both developed and developing countries may not have the luxury of considering long-term productivity of soils or the total farm. Finally, how we evaluate sustainability, of practices or systems, depends on how this philosophy is defined: sustainable for how long, and under what assumptions about resources and quality of the environment? The methods developed in a farming systems context are uniquely suited to provide some of this information and focus.

Problems with Definitions

The broad definitions given in the introduction provide a useful philosophical framework within which to consider specific practices and systems. The confusion surrounding terms was described by Lockeretz (1988), and this is not likely to be resolved due to the range of people and organizations embracing these terms, if not the concepts, described here. Choice of the term, sustainability, is complicated by the fact that it is too good; everyone appreciates that agriculture must be sustainable. But we differ in the interpretations of conditions and assumptions under which this can be made to occur. And we differ in time frames. One mechanistic definition was advanced to help researchers and farmers choose specific practices as components of production systems to lead to specific goals (University of Nebraska, 1987):

A sustainable agricultural system is the result of a management strategy which helps the producer to choose hybrids and varieties, soil fertility packages (including rotations), pest management approach, tillage methods and crop sequence to reduce costs of purchased inputs, minimize the impact of the system on the immediate and the off-farm environment; and provide a sustained level of production and profit from farming.

This definition lacks specificity in terms of time frame, resource availability, and environmental impact, all of which must be considered if we are concerned about evaluating specific technologies and how "sustainable" certain systems will be when comprised of these pieces of technology.

Evaluation Criteria

Not only do we have problems defining sustainability, we have no useful means of measuring it. For example,how much more sustainable is one practice or system than another? Furthermore, we have not incorporated appropriate evaluation criteria into our research and extension procedures. Among other shortcomings is the failure to take into account time and resource dimensions. One of the most common evaluation criteria for measuring the effect of alternative technologies on crops is kilograms per hectare. The use of this criterion implies that 1) quantity produced is the important result of the production process, 2) land is the most limiting resource, and 3) the length of the production process is not relevant. Economists usually consider net income per hectare as the important criterion. This implies that quantity, itself, is not important, but the difference between how much it is worth and how much it costs to produce. However, this criterion still implies that land is the most limiting resource and that the length of the production process is not relevant. To compare two different kinds of rotations would require the incorporation of the length of the rotation in years. For example, yield or net income per hectare, averaged over the number of years each rotation lasts, could be used.

These relatively common criteria, however, do not improve our measures of sustainability nor our capabilities to compare the sustainability of different systems. If we are concerned with nitrate contamination of ground water, for example, we will need to begin using such criteria as kilograms per unit of nitrate leached or net income per unit of nitrate leached. Another criterion might be kilogram per unit of toxic chemical applied. In either of these cases, an increase in the criterion would presumably be associated with more sustainability. But time is still not included in either case. If we are concerned with the depletion of tropical rain forests, perhaps a useful criterion would be kilogram per hectare of forest destroyed. Comparing two systems with this criterion would allow us to choose the one which either produced more for the same amount of destruction or produced the same amount with less forest destruction.

Even with these criteria, however, we have still not solved the problem of incorporating the time frame into the measure of sustainability. If "more sustainable" means "longer," then we certainly must be able to measure longevity. A paper presented at the symposium (Hildebrand and Ashaf, 1989) reports an unsuccessful attempt to do this.

From Philosophy to Management Practices

Although sustainable agriculture is considered a philosophy to guide technology development and the design and implementation of resource-efficient farming systems, in practice this means the choice of specific inputs, practices, or management options that will contribute to the overall goals. The component technologies or practices must be sorted out in relation to the natural and cropping environments; the goals of the farm family; the resource base within which the farm is managed; and society's goals with respect to the use of natural resources and the importance of respecting the well-being of future generations.

Because of the climatic and farm location specificity of practices and crop/animal systems, it is difficult—if not impossible—to generalize about farming practices that meet the criteria described above. Yet there are general approaches to development of technology and examples of specific practices that help to illustrate both philosophy and principles of sustainable agriculture (Francis, 1989; Francis and Youngberg, 1989).

Crop varieties and hybrids that include genetic tolerance or resistance to insects, plant diseases, drought, and extremes in temperature are especially useful in reducing input costs and risks of crop loss. Different maturities of crops within species provide more flexibility for planning cropping and crop/animal integrated systems, for example by avoiding drought, making best use of available rainfall, providing forage as well as grain, or fitting a specific niche in a farming system. Genetically diverse varieties or hybrids often provide greater biological buffering to resist unexpected variation in climatic conditions.

Sustainability of systems and reduced production costs may be promoted by greater use of biological or cultural control methods for insects, diseases and weed problems. Integrated pest management makes increased use of information as a substitute for all or part of the pesticides purchased to control unwanted species in a field. Crop rotations can play a major role in improved systems. Alley cropping and other agroforestry systems can make more efficient use of the total natural resource base throughout the year and protect the soil against wind and water erosion. The increased diversity of these patterns also helps to attract and preserve biotic diversity, often giving an enhanced potential for biological control of pests. Rotations, as well as carefully designed agroforestry patterns, can promote nutrient cycling and efficient resource use.

These can be coupled with reduced tillage to save fuel, maintain crop residue cover, and minimize potential for soil erosion. Reduced chemical applications and tillage often will enhance soil arthropod populations and activity.

Diversity of crop and animal species and products from the farm can further buffer the economic returns to land, labor, and capital. When maximum attention is paid to value-added products, this economic stability or sustainability can be enhanced even further. Feeding non-marketable grains or crop residues to livestock before sending the end product to market can give higher returns to inputs, and manure can be returned to the land. With non-chemical management, organic food channels provide higher prices for products and potentially greater return to the grower. New avenues for marketing, consistent with farm location, time available, and family goals, can further enhance the value of farm produce. If farm-related industry is promoted, both on the farm and in nearby communities, it is possible to enhance both the sustainability of farms and the community infrastructure that is essential for their long-term viability.

Precisely which practices fit into each operation and which of the above really fits into any specific farming system depends entirely on the local resources, management options available, ability of the farm operator, family members to implement the changes, and whether these help the family to meet long-term goals. There is growing concern about health and safety on the farm, and this is leading to research and testing of a wider range of alternative practices. In any case, the methods of FSRE are uniquely suited to the screening of potential alternatives, the search for other options suggested by farmers, and the practical testing of these practices against current management approaches. In many locations, a limited research base and few recommendations for some of these practices are available. The methods outlined above, which are available in FSRE, are well recognized as viable routes to evaluate applications of new technologies or practices in a real-world situation while farmers are gaining experience with them at the same time.

There is a growing literature about the critical role sustainability will play in future decisions in the agricultural industry. There are numerous examples of environmental impacts of current systems in symposia publications from the past decade (Bezdicek, 1984; Edwards et al., 1989; Power, 1987). Crop protection alternatives without chemicals, or with drastically reduced applications, have the potential to significantly reduce the total amount of pesticide introduced into the environment (Bird et al., 1989; Liebman and Janke, 1989; Ware, 1989). Soil fertility potentials and economics in reduced chemical fertilizer systems have been described and documented (King, 1989). Finally, the conversion to systems with lower inputs has been explored and quantified by a number of researchers and farmer collaborators (Andrews et al., 1989; Kirschenmann, 1988). Recently the National Academy of Sciences published a National Research Council book on alternative agriculture (National Academy of Sciences, 1989). This emerging literature on alternative management systems gives greater confidence to extension and development people in the field who are promoting systems that depend on reduced inputs. The application of FSRE methods in the testing and widespread demonstration of these techniques will provide even more information on how they apply in a wider range of circumstances. Environmental and resource issues will be better understood as educational activities are focused on farmers as well as the general public.

Conclusions

No one would advocate a "non-sustainable agriculture!" On the other hand, even though we are not able to define nor measure "sustainable agriculture," the concerns which it expresses are here to stay. We must become more concerned with our biosphere and with the well-being of future generations. This means we must develop agricultural practices that are less damaging ecologically and more efficient in the use of both renewable and non-renewable natural resources. As developers of agricultural technologies in the broadest context, we must work with policy makers and heed society's concerns as reflected in policies they make. We must become attuned to the world around us and accept the challenges which are forthcoming. Farming systems research and extension methodologies are uniquely suited to this task. Let's get on with the work.

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Ware, G.W. 1989. *Complete Guide to Pest Control, With and Without Pesticides*. Fresno, California: Thompson Publishers, 290 pp.

Invisible Women: Gender and Household Analysis in Agriculture Research and Extension

A presentation has been developed to assist agricultural researchers, extension workers, and managers of research and extension projects in learning about gender issues in agriculture and to use gender analysis as a descriptive and analytical tool in their work. Gender analysis is increasingly being recognized as a critical aspect of program and project success. The module can be used alone as a separate module on gender within a larger training course or as an introduction to other training activities on gender issues. The presentation is available as a slide set or VHS video. It is accompanied by a trainer's guide that includes scripts in English, Spanish, and French, and description lists for the slides. The video version is presently available only in English; however, Spanish and French versions will be available in 1990. Copies of either the slide set ($100.00) or the video ($35.00) may be ordered. A limited number of free sets are available to developing country nationals. For more information, please write:

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ISNAR Publishes Study Results

In 1986 the International Service for National Agricultural Research (ISNAR) launched a major study on the institutionalization and organization and management of on-farm, client-oriented research in national agricultural research systems. ISNAR is now publishing the findings and conclusions of the study. All publications from the study will be available in 1989.

The objective of the study is to provide a body of practical experience and advice for research managers to draw upon as they strive to strengthen on-farm research and make it an integral and stable part of their research systems.

The approach has been to learn from the experiences of research managers in developing countries. The analysis is built around case studies of national research systems that have formally integrated on-farm client-oriented research as a major activity and have at least five years experience implementing this type of research. Nine countries were included in the study: Bangladesh, Ecuador, Guatemala, Indonesia, Nepal, Panama, Senegal, Zambia, and Zimbabwe.

Each case study, prepared by a team of national researchers, analyzes the organization and management of on-farm research in the national research system; assesses its strengths and weaknesses in terms of the effective and efficient implementation of on-farm research; draws out practical lessons for research managers; and provides concrete recommendations for strengthening the conduct of on-farm research in the country.

In addition to the case studies, ISNAR is producing a series of comparative study papers on key management themes that synthesize the findings, conclusions, and lessons to be drawn from the cross-country analysis. A final synthesis paper will be ready by the end of 1989.

Single copies of the study's publications are available upon request and are free-of-charge to institutions and individuals managing or working in on-farm research. Publications may be ordered from ISNAR, P.O. Box 93375, 2509 AJ, The Hague, Netherlands, Attn: Dr. D. Merrill-Sands. All requests should include name, institutional affiliation, profession, and mailing address.

Publications available:

Case studies

1. Kean, S., and L. Singogo, 1988. Zambia: a case study of the organization and management of the adaptive research planning team (ARPT), Ministry of Agriculture and Water Development.
2. Ruana, S., and A. Fumagalli, 1988. Guatemala: organizacion y manejo de la investigacion en finca en el Instituto de Ciencia y Tecnologia Agricolas (ICTA).
3. Kasyastha, B., S. Mathema, and P. Rood, 1989. Nepal: a case study of the organization and management of on-farm research.

Comparative study papers

1. Merrill-Sands, D., and J. McAllister, 1988. Strengthening the integration of on-farm client-oriented research and experiment station research in national agricultural research systems: management lessons form nine country case studies.
2. Ewell, P., 1988. Organization and management of field activities in on-farm research: a review of experience in nine countries.
3. Biggs, S. 1989. Resource-poor farmer participation in research: a synthesis of experiences in nine national agricultural research systems.

Forthcoming in 1989:

Case studies

Avila, M., E. Whingwiri, and B. Mombeshora, In press. Zimbabwe: a case study of five on-farm research programs in the Department of Research and Specialist Services, Ministry of Agriculture.

Budianto, J., I. G. Ismail, Siridodo, P. Sitorus, D. D. Tarigans, A. Mulyadi, Suprat, In press. Indonesia: a case study on the organization and management of on-farm research in the Agency for Agricultural Research and Development, Ministry of Agriculture.

Cuellar, M., In press. Panama: un estudio del caso de la organizacion y manejo del programa de investigacion en finca de productores en el Instituto de Investigacion Agropecuaria de Panama.

Faye, J., and J. Bingen, In press. Senegal: organisation et gestion de la recherche sur les systems de production, Institut Senegalais de Recherches Agricoles.

Jabber, M., and Md. Zainul Abedin, In press. Bangladesh: a case study of the evolution and significance of on-farm and farming systems research in the Bangladesh Agricultural Research Institute.

Soliz, R., P. Espinosa, and V. Cardoso, In press. Ecuador: un estudio de caso de la organizacion y manejo del programa de investigaciones en finca de productores (PIP) en el Instituto de Investigaciones Agropecuarias.

Comparative study papers

Bingen, R. J., and S. Poats, In preparation. The development and management of human resources in on-farm, client-oriented research: lessons from nine country case studies.

Ewell, P., In press. Linkages between on-farm research and extension in nine countries.

Merrill-Sands, D., et al., In preparation. Alternative arrangements for organizing on-farm, client-oriented research: comparative strengths and weaknesses.

Merrill-Sands, D., et al., In preparation. Institutionalizing on-farm, client-oriented research in national agricultural research systems: a synthesis of experiences from nine countries.

Suggested Reading

PERIODICAL LITERATURE

❑ *Agriculture and Human Values*

Agricultural Development and the Quality of Life: An Anthropological View, by Peggy F. Barlett and Peter J. Brown, Spring 1985, Vol. 2, No. 2, pp. 28-35.

Agricultural Development and The Theory of Induced Innovation, by Paolo Palladino. Spring-Summer 1987, Vol. 4, Nos. 2-3, pp. 53-64.

Extension Systems and Modern Farmers in Developing Countries, by Celia Jean Weidemann. Winter 1985, Vol. 2, No. 1, pp. 56-59.

In the Field - A Proposed Framework for Designing Livestock Development Projects in West Africa: The Gambia as an Example, by Neil A. Patrick and Sandra L. Russo. Spring-Summer 1987, Vol. 4, Nos. 2-3, pp. 105-110.

Integrated Natural Resource Management: Why?, by Lawrence R. John. Spring-Summer 1987, Vol. 4, Nos. 2-3, pp. 94-110.

Rationality of New Technology for Small Farmers in the Tropics, by Charles A. Francis. Spring 1985, Vol. 2, No. 2, pp. 54-59.

Rural People, Resources, and Communities: An Assessment of the Capabilities of the Social Sciences Agriculture, by James C. Hite. Winter 1987, Vol. 4, No. 1, pp. 27-41.

Towards a Grassroots Approach to Rural Development in the Third World, by Miguel A. Altieri. Winter 1985, Vol. 2, No. 1, pp. 45-48.

The Underside of Development: Agricultural Development and Women in Zambia, by Anita Spring and Art Hansen. Winter 1985, Vol. 2, No. 1, pp. 60-67.

Women in Agriculture, by Cornelia B. Flora. Winter 1985, Vol. 2, No. 1, pp. 5-12.

❑ *Journal of Production Agriculture*

Challenge for the Future: Incorporating Systems into the Agricultural Infrastructure.
by A. Weiss, and J.G. Robb, 1989, Vol. 2, pp. 287-289.

ABSTRACT

In a systems approach, the distintion between research and extension is blurred. There must be an appropriate reward structure that acknowledges this continuity of effort if systems are to be successful. A systems structure can take at least three forms: ad hoc, center, or departmental status. Guidelines to evaluate systems efforts are given.

❑ *American Journal of Alternative Agriculture*

On-Farm Experiment Designs and Implications for Locating Research Sites.
by P.E. Rzeqnicki, E.R. Thompson, G.W. Lesong, W. Elmore, C.A. Francis, A.M.Parkhurst, and R.S. Moomaw, 1988, Vol. 3, pp. 168-173.

ABSTRACT

Research plots that are large enough to accommodate regular farm machinery are thought to contain too much field variation to allow reliable interpretation of experimental results. This study was conducted to determine whether experimental error was controlled on a wide variety of agricultural field trials that used plots larger than those normally used by researchers. The investigation included trials conducted on an experiment station as well as trials conducted on actual commercial farms. The planning and management of the experiments ranged from those completely conducted by university researchers to those completely done by farmers.

The level of experimental error in all the trials was well within the limits normally accepted by researchers in agronomy. Plots ranging in length from 125 to 1200 feet and as wide as one to two passes of standard farm machinery gave experimental results that were statistically sound. Statistical requirements for randomization and replication were all met.

The ability to use large plots and farmer participation enhances the testing of new technology on farms. This leads to new opportunities to test crop production factors in a systems setting under actual farm conditions. The statistical reliability of the on-farm designs analyzed in this study should increase cooperation among researchers, extension workers, and farmers in research activities.

❑ *Culture and Agriculture*

Culture and Agriculture is the bulletin for the Culture and Agriculture Group, which is an organization of academics and practitioners interested in agriculture development and agrarian transformation. *Culture and Agriculture* welcomes members concerned with social, biological, and environmental aspects of agriculture who are interested in dialogue, debate, and collaboration.

The spring/summer issue (Number 38) of *Culture and Agriculture* featured several articles of interest to FSRE practitioners. These articles focused on the impact that FSRE work is having throughout the world. David Norman's paper, "Accountability: A Dilemma in Farming Systems Research," discusses how FSRE work has had difficulty in achieving accountability due to its multiple client focus, limited access to research resources, and need for incorporating societal goals. The rest of the articles summarize the findings of a USAID—funded worldwide survey that reviewed, analyzed, and docu-

mented the results of FSRE projects/ programs. This study sought to determine the degree to which externally-funded FSRE projects have assisted in institutionalizing FSRE within national agricultural research and extension systems. Contributing authors included Timothy R. Frankenberger, Timothy J. Finan, Billie R. DeWalt, Harold J. McArthur, Robert E. Hudgens, Cornelia Butler Flora, Noel Young, Kanok Rerkosem, and G. Mitawa. The study relied on field case studies in Indonesia, Guatemala, Botswana, and Costa Rica, and a secondary review of FSRE programs. *Culture and Agriculture* is published three times a year. The editor welcomes relevant contributions - articles, news items, publication announcements - for consideration in future issues. Address comments, contributions, and requests for mailing to:

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❑ *Alternative Agriculture News*

Alternative Agriculture News is published monthly by the Institute for Alternative Agriculture, Inc., a non-profit research and education organization headquartered at 9200 Edmonton Road, Suite 117, Greenbelt, Maryland 20770. The newsletter is provided as a service to members. Individual membership in the Institute is available to organic farmers, agricultural researchers, and other interested persons at $15.00 per year. All contributions are tax-deductible. For information, contact the Institute.

OTHER PUBLICATIONS

Recent Southeast Asian Publications Related to FSRE

Developments in Procedures for Farming Systems Research: *Proceedings of an International Workshop, 13-17 March 1989, Puncal, Bogar, Indonesia.* Edited by Soleh Sukmana, Pervaiz Amir, and Djojo M. Mulyadi, Agency for Agricultural Research and Development (AARD), Co-sponsors: Winrock, CIMMYT and IDRC.

Contains 27 papers divided into sections on Overview, Methods, Experience and Institutions, Management, Communication, and Extension. Topics covered include: evolution and future of farming systems in Indonesia; approaches for on-farm and client-oriented research; sustainable agricultural systems; on-farm agroforestry; home gardens; crop-animal interactions; organization and management of on-farm research; communication between research and extension; and introducing a farming systems perspective in MS degree curricula.

Available from AARD and Winrock International Institute for Agricultural Development, Bangkok, Thailand.

Sustainable Rural Development in Asia: Selected Papers from the Fourth SUAN Regional Symposium on Agroecosystem Research, Khon Kaen University, Khon Kaen, Thailand, July 4-7, 1988. Edited by Terd Charoenwatana and A. Terry Rambo.

Contains 18 papers and 9 abstracts organized around five subheadings: The Sustainability of Rural Ecosystems; Measuring the Sustainability of Rural Ecosystems; Critical Problems of Sustainability and Suggested Solutions; and Research Approaches for the Study of Sustainability. Topics covered include: diversification in highland cropping systems in Northeast Thailand; water resource development in the Philippines; role of trees in paddy fields; cost of soil erosion; dams as agents of rural development; integration of conservation into the development process; and farmer participation in the development of sustainable cropping systems for sloping acid upland.

Available from the SUAN Secretariat, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand.

Filipino Women in Rice Farming Systems — Selected papers from the Consultative Workshop on Women in Rice Farming Systems in the Philippines, March 26, 1987.

Sponsored by the University of the Philippines, Los Banos, the Philippine Institute for Development Studies, the Center for Policy and Development Studies, the International Rice Research Institute (IRRI), and the Ford Foundation. Contains 14 papers dealing with the role women in root crops technology, handwatering agriculture, integrated pest management, cooperatives, and extension training.
Available from IRRI or through AGRIBOOKS.

Rapid Rural Appraisal: Proceedings of the 1985 International Conference and Rapid Rural Appraisal in Northeast Thailand: Case Studies.

The proceedings, published in 1987, contain 16 papers organized around three subheadings: The Need for RRA, Its Evolution and Underlying Concepts; Important Methods, Tools and Techniques in RRA; and Contents and Types of RRA Applications. The companion volume of case studies was published in 1988 and contains an introduction and overview of RRA activities at Khon Kaen followed by six case studies. The cases demonstrate the application of RRA to such issues as fuelwood, dairy production, maintenance of small-scale water resource systems, cooperative labor and the environmental effects of a national park road.

Both volumes are available from the Rural Systems Research Project, Faculty of Agriculture, Khon Kaen University.

Man, Agriculture and the Tropical Forest: Change and Development in the Philippine Uplands, Edited by Sam

(continued on page 16)

Membership Information

First year fees for membership in the AFSRE are US$40 for citizens of the United States, Canada, Europe, Japan, Australia, and New Zealand. For students studying in these countries the fee is US$20. The membership rate for residents of all other countries is US$10. Membership dues can be paid by a check drawn on a U.S. bank, or by international money order payable to the Association for Farming Systems Research-Extension in U.S. dollars. Mail membership fees, along with the membership directory information, to:

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Members will receive copies of the *Journal of Farming System Research-Extension* (beginning with the proceedings of this year's symposium) and the *FSRE Newsletter* and will be eligible to participate in elections of, and serve as, officers and Board members of the Association. First year members will also be eligible to vote on the constitution, which will be presented at the symposium at Michigan State University, October 1990, and distributed to members of record before that time.

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(continued from page 14)

Fujisaka, Percy E. Sajise, and Romulo A. del Castillo. Winrock International Institute for Agricultural Development, Bangkok, Thailand, 1986.

The book contains 13 papers dealing with different aspects of upland development in the Philippines. Topics relevant to FSRE include: economic impact analysis; social forestry; agroforestry systems for smallholder farmers; and land tenure. A final paper by Fujisaka and Sajise presents a synthesis of lessons, unresolved issues and implications with respect to change and "development" in the uplands. Available through AGRIBOOKS.

Agroecosystem Research in Rural Resource Management and Development. Edited by Percy E. Sajise and A. Terry Rambo, September 1985.

The volume contains selected papers from the Second SUAN-EAPI Regional Symposium on Agroecosystem Research, hosted by the Program on Environmental Science and Management (PESAM) of the University of the Philippines, Los Banos. Issues addressed by the various authors include: land resource management; contribution of homegardens to diet and income; agricultural systems research in Asia; rapid community appraisal; and land use decision making. One paper of particular interest to FSRE researchers is a comparative discussion by Christopher Gibbs of human ecology, agroecosystems research, farming systems research, and cropping systems research in Asia.

A Review of AID Experience: Farming Systems Research and Extension Projects 1975-1987 by Kerry J. Byrnes.

This book focuses on AID's experience with farming systems research and extension projects. The study is based on a review of evaluation documentation for a sample of twelve AID-funded FSRE projects implemented during the 1975-1987 period: seven projects in Africa, two in Asia, and three in Latin America and the Caribbean. The study contributes to the ongoing discussion within AID about the potential of FSRE, or the useful elements thereof, to assist the Agency in meeting its mandate. Prepared under a Center for Development Information and Evaluation (CDIE) contract with LABAT-ANDERSON Incorporated, the study was completed in December 1988.
Send inquiries to: CDIE, Bureau for Program and Policy Coordination, Agency for International Development, Washington, DC 20523-1802.

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