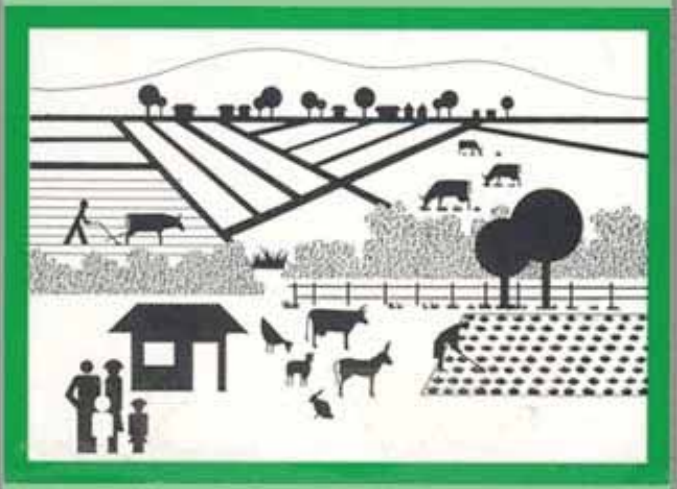
FARMING SYSTEMS DEVELOPMENT

A participatory approach to helping small-scale farmers



Food and Agriculture Organization of the United Nations

FAO-SWEDEN FARMING SYSTEMS PROGRAMME
IN EASTERN AND SOUTHERN AFRICA

FARMING SYSTEMS DEVELOPMENT

A participatory approach to helping small-scale farmers

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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INTRODUCTION

The purpose of this publication is to promote the use of farming systems development (FSD) techniques in identifying appropriate ways to help small-scale farming households improve their productivity and levels of living in an equitable and sustainable manner. This approach places considerable emphasis on farm households and their members participating directly in the identification of their needs, screening possible initiatives designed to solve their problems and, when appropriate, directly evaluating those initiatives through on-farm testing.

As well as advocating farmer participation in defining their needs, we also advocate that donors adopt a more participatory approach to giving aid to those responsible for addressing the requirements of small-scale rural households. In the long run, this is likely to improve the efficient use of such funds, as well as benefit the national institutions and representatives. themselves through giving them a feeling of greater responsibility and ownership.

Before discussing the participatory elements in some detail, we shall explain why it is still essential to help improve living standards of the 400 million rural households scattered around the globe. The publication concludes with two examples of initiatives that have been offered to small-scale farmers which have relied heavily on farmer participatory techniques, so central to the FSD approach.

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Contrary to the common assumption that the world food situation is steadily improving, the current situation for many developing countries is that population growth exceeds the rate of increase in food production. Moreover, meeting future food needs faces even greater challenges as the impact of the Green Revolution levels off, the unused agricultural land base becomes increasingly scarce, and sustainability and environmental concerns receive greater attention.

Over the next 20 years two billion people will be added to the world population. This is equivalent to twice the present population of China. The increase will occur mainly in developing countries. Little additional land is available for cultivation and too much marginal land is already cropped, often resulting in rapid environmental degradation. The amount of cropland per person worldwide decreased 25 percent between 1950 and 1975 and will drop another 15 percent by the tum of the century.

The 1992 International Conference on Nutrition held in Rome concluded that 780 million people in developing countries still do not have access to enough food to meet their basic daily nutritional needs.

In the last ten years food production per capita has declined in 76 percent of the countries in Africa, 64 percent of the countries in Latin America, and 48 percent of those in Asia. Food yield per hectare

must increase by 40 percent over the next 20 years to maintain the present level of food availability.

The Importance of the Small-Scale Agricultural Sector in Developing Countries

The small-scale agricultural sector will continue to be very significant in developing countries for a long time to come because:

- A majority of the population currently lives in rural areas. Consequently, the number of those dependent on agriculture for their major means of livelihood is likely to remain high for the foreseeable future (Box 1).
- The absorptive capacity of the non-agricultural sector is limited (Box 2).
- People employed in the non-agricultural sectors often face a high degree of economic vulnerability, especially those in the lower income brackets. Industry is particularly vulnerable. A socially stable and commercially viable small-scale agricultural sector can act as a buffer in absorbing tensions and reducing economic vulnerability, in cases where economies are in transition.

Most of the disadvantaged people live in rural areas. They therefore tend to be relatively poor and are likely to be malnourished or even undernourished for part or the whole of the year. Increasingly, it is recognized that "those who don't produce don't consume".

Box 1: Growth of the Agricultural Labour Force

The rate of growth of the agricultural labour force can be examined by means of the following relationship:

$$Z = \frac{P\text{-}NY}{1\text{-}N}$$

Where:

Z = Rate of growth of the agricultural labour force

P = Rate of growth of the population (i.e., labour force) (e.g., 3 percent)

N = Proportion of the labour force in the non-agricultural sector (e.g., 0.25)

Y = Rate of growth in non-agricultural employment opportunities (6 percent)

Using the above figures, which are fairly typical of many developing countries, the annual rate of growth in the agricultural labour force (i.e. Z) would be 2 percent.

Therefore it is not just a matter of solving the food production problem **per se**, but also one of addressing the question of "who produces". Helping small-scale farmers produce addresses both these issues.

Although the majority of the population living in rural areas derives its living from producing crops and/or raising livestock, some supplement their incomes with activities indirectly related to agriculture through links with the non-agricultural sectors. These can involve distributing, marketing and processing inputs and agricultural products.

Box 2: Absorptive Capacity of the Non-Agricultural Sector

The enormity of the task of absorbing any increases in the population into the non-agricultural sector, particularly where most of the population still resides in the rural areas, can be described by the following relationship:

$$R = P/N$$

Where:

R = Rate at which the number of jobs must to expand to absorb all increases in population.

P and N are defined the same way as in Box 1

Using the same figures as before (see Box 1) indicates that non-agricultural sector employment opportunities (i.e., R) would have to increase at an annual rate of 12 percent - an almost impossible task.

Therefore, helping small-scale farmers improve their level of welfare by increasing their productivity, particularly through food production, creates favourable interdependencies, or favourable forward and backward linkages with the non-agricultural sector (e.g., cheap food for those outside agriculture, substantial numbers of consumers for products and services produced by those outside the non-agricultural sector, etc.).

Therefore, helping small-scale farmers improve their level of living is critically important not only for the farming families themselves but for society as a whole.

Modem Mechanized Agriculture Versus Traditional Small-Scale Fanning

Modern large-scale commercial farming produces food, but does little to alleviate poverty. Also, some question its environmental sustainability particularly in the ecologically more fragile areas and policies that promote the modernization of agriculture which only focus on raising food production in the short-run are increasingly being questioned. There is now heightened recognition that questions such as who produces the food, who can consume it, and where production takes place, are often as important as how much is produced. This shift in thinking and establishing priorities concerning agriculture in developing countries is very clear. In recent years there has been a significant change in many developing countries from a goal of national food self-sufficiency to one of national and household food security. The goal of household security is to provide all families with the means, through work, to produce or purchase the food necessary for their survival, in a manner that is sustainable (in both ecological and livelihood terms) in the long run.

As a result the quest for maximising current commodity productivity is now progressively giving way to sustainable management of natural resources. High external input single enterprise farming is increasingly being questioned and serious attention is now being paid to low external input multi-enterprise integrated farming. There is a general consensus that in many countries the backbone of national food security, for the foreseeable future, will be the small-scale farmer. Too little attention has been given to the question of how small-scale farming can be stimulated and made profitable, dependable and sustainable.

Over the next 20 years, decreasing reserves of fuel and phosphates appear likely to bring about major cost increases in fertiliser inputs, which may make high external input agriculture less attractive. The majority of small-scale farmers have limited access to external inputs and there is little chance that this situation will improve in the future. In such a situation, to make farming sustainable, researchers and farmers will have to focus their attention on greater reliance on internal inputs (i.e., inputs that do not need to be purchased) and on the beneficial effects of biological interaction that can result from the diversified farming systems (i.e., consisting of crops, livestock and off-farm enterprises) that small-scale farmers have traditionally practiced. Incorporation of legumes and recycling of crop residues and manure are often important ingredients of such systems.

For researchers, this implies greater use of a system perspective in the search for relevant improved technologies. This is needed in order to complement the more conventional reductionist approach which has played such a significant role in developing technologies that contributed to the Green Revolution, and the development of specialised farming systems that, in turn, have often made mechanisation economically viable, at least in the short run.

Sustainability and the Small-Scale Farmer

In developing countries, the rate of population growth and the level of population density are important determinants of ecological sustainability. For example:

- Traditionally, small-scale farming practices have usually been sustainable, evolving slowly over time in response to gradual

increases in population density. Obvious examples are shifting cultivation systems characteristic of low population density areas of Africa, and the ring cultivation (e.g., Burkina Faso) and **kibanja** (e.g., Tanzania) systems, characteristic of more densely populated areas.

- Unfortunately, many of the traditional farming systems have not been able to evolve quickly enough to offset the increased population densities resulting from rapid population growth. As a result, some of the practices currently used by small-scale farmers are unsustainable, resulting in environmental degradation. Unlike developed countries, where environmental degradation is caused by wealth and excessive use of external inputs (e.g., pesticides), the root cause in developing countries is usually poverty. Small-scale farmers are very conscious of the problem but, under such circumstances, producing enough to survive in the short term has had to take precedence over strategies ensuring long-run sustainability. Under such circumstances traditional systems of resource management break down while viable alternatives rarely exist. Increasingly, extending the area cultivated is not an alternative, and where such potential does exist, the land is often of poorer quality and is even more vulnerable to environmental degradation. Thus the relationship can be described as a vicious circle: poverty leads to environmental destruction that in turn leads to more poverty.

For the small-scale farmer in developing countries, problems of environmental degradation will get worse unless efforts to increase productivity -- and hopefully their welfare -- and sustainability (i.e., both in ecological and livelihood terms) are simultaneously addressed.

This is in contrast to some developed countries, such as the United States, where one of the strategies for addressing conservation or ecological sustainability is through incentives to remove land from crop production for extended periods. Thus, we believe that the challenges in addressing ecological sustainability, although great in developed countries, are even greater in developing countries.

To sum up, if the profitability of agricultural production is not improved, strategies to encourage sustainability are likely to fail. For small-scale farmers in developing countries, productivity and sustainability issues have to be addressed simultaneously. As far as farmers are concerned, the closer they are to the survival level, the greater will be the likelihood that their perceived needs will be those that require short-term fulfillment (e.g., producing enough food to survive until next year). As a result, they are unlikely to be able to afford the luxury of being too concerned about long-term sustainability. The critical nature of food security and sustainable resource management is consequently very clear.

Rational Decision-Making by Small-Scale Farmers

Rational behaviour is behaviour that is consistent with one's ends or goals. It is therefore critically important to identify those ends or goals in order to be able to assess whether farmers are acting in a manner that is rational. In large-scale agriculture, which is synonymous with commercial agriculture, the goal is usually assumed to be profit maximisation. However, for small-scale farmers in developing countries, the ends or goals are likely to be different. Therefore, different evaluation criteria are necessary. Small-scale farmers are likely to adopt strategies aiming at the goal of a substantial degree of

food self-sufficiency while minimising risk.

This is because of the nature of small-scale farming in developing countries. It is practiced by households which are both production and consumption units. They generally have to cope with very complex farming systems (i.e., crops, livestock and off-farm) and work within limits set by the fact that they are only partially commercialized. The practices used in these constraining circumstances can often be very sophisticated. An obvious example is that of intercropping, consisting of growing crops in mixtures, a practice that in recent years has been shown to be very rational. There is increasing appreciation that the indigenous knowledge that small-scale farmers possess can be very important in designing ways to improve their farming systems. After all, this indigenous knowledge has enabled them to survive for generations and reflects an intimate interaction with the environment within which they operate. This knowledge is also continuously growing because many small-scale farmers are natural experimenters. Hence, traditional methods are not necessarily primitive. Unfortunately, sophistication in farming is often incorrectly equated only with commercialised and mechanised agriculture.

LIMITED SUCCESS OF DEVELOPMENT OF SMALL-SCALE FARMING

Reasons for limited Success in the Development of Small-Scale Agriculture

There has been some success in improving the levels of productivity and welfare of small-scale farmers particularly in areas where the Green Revolution has succeeded. However, these areas were distinctive in a number of ways; they had homogeneous and favourable production environments (i.e., good climate and soils) and the availability of varieties of wheat, maize, and rice that were very responsive to fertilizer. In these areas, the process was also made easier by easy access to the necessary improved inputs and markets for the products. In addition, in Green Revolution areas, farmers were able to benefit from the improved technologies even if they did not always apply them correctly and the inputs they used were easily divisible (e.g., they could use a little or a lot of improved fertilizer or seed). In short, it could be argued that in Green Revolution areas, there was a natural fit between the environment and the plants.

However, in Sub-Saharan Africa, and also in certain parts of Latin America and Asia, there has been no Green Revolution, and hence little or no success in the development of small-scale agriculture. This is because the climatic conditions are often unfavourable (i.e., too much or too little rainfall); the soils are generally poor; the production environments are very heterogenwus and without resources; and the input and output markets are inadequately developed. Not surprisingly, there has been great difficulty in developing improved technologies which are attractive to farmers in these areas. These are

characterized by a high degree of production risk or production instability. In many parts of these poorer areas (e.g., semi-arid areas of Africa), farmers have to do things exactly right if they are to succeed. They must, for example, carry out planting on good soil moisture and at first they often need indivisible (i.e., quantum) inputs (e.g., control over traction). Thus, the technology ladder is more complex. The first rungs, in contrast to more favourable environments, require large investments because of the need for large lump sum inputs, as opposed to the smaller investments that are possible with divisible inputs (e. g., improved seed, fertiliser, etc.). Also, yield increases are not so good since they tend to involve incremental rather than major (i.e., revolutionary) changes in yields. This makes them inherently less attractive to farmers. The implication for technical scientists operating in these poorer and riskier environments has been that, in contrast to Green Revolution type environments, much greater emphasis on modifying the plant to fit the environment is needed. This is a very challenging task, and is less likely to yield spectacular results.

The conventional reductionist, empirical and productionist approach, which has had some degree of success in more favourable production environments, has not worked well in less favourable environments. This approach has often placed insufficient emphasis on understanding the processes involved in obtaining those yields. Yield has been treated as an easy-to-measure proxy variable reflecting the complex interaction between the different parts of the production environment. This may be partially acceptable, at least in the short-run, for developing possible improved technologies in favourable production environments. However, there appears to be no short-cut possible in developing improved technologies in poorer production environments, characterised by highly diversified farming systems. In such areas, a

good understanding of the environment combined with a systems perspective, is likely to be critically important in developing relevant improved technologies. In such areas, therefore, there appears to be no "quick fix" to improving productivity, and the consequent development of small-scale agriculture.

The lack of success in the development of small-scale agriculture, particularly in poorer production environments, can be attributed in many developing countries to imbalances in the allocation of skills, approaches and resources on the part of research, planning and extension agencies. These agencies have tended to favour the interests of larger-scale farmers who are often more commercialised and tend to be more mechanised.

Donor Support to Small-Scale Development

Donor assistance to the agricultural sectors in many developing countries has decreased significantly in recent years. Two factors have contributed to this decline:

- Economic problems in the donor countries themselves, resulting in increasing pressures for cuts in developmental aid.
- The need for a perceived pay-off from such aid in the short to medium term -- something that rarely has occurred in agriculture.

It is unfortunate that donors are losing interest at a time when support for agriculture is urgently required to ensure that improvements in

agricultural productivity -- which are increasingly dependent on intensification rather than enlarging cultivated areas -- are achievable in a manner that is sustainable in the long run. The increases in agricultural productivity that occurred in the late 1970's and during the 1980's were mainly due to investments in agricultural research during the 1960's. To ensure future food supplies and security, investments need to be made now.

In the 1980's much donor support was concentrated on farming systems development (FSD), also known as farming systems research, farming systems research and extension, on-farm research with a farming systems perspective, etc. This approach, which evolved in the mid 1970's, was specifically geared to the needs of small-scale farmers -- particularly those operating under challenging environmental conditions. Perhaps the FSD approach was too enthusiastically accepted by many donor agencies before the fruits of the process had been given time to mature, a concern that had been expressed at the beginning of the period. In any case, by the mid 1980s, about 250 medium- and long-term projects worldwide were carrying out FSD type work. For example, between 1978 and 1988, the United States Agency for International Development (USAID) financed 76 bilateral, regional, and centrally funded projects containing either a farming systems orientation or clearly focusing on farming systems work. Forty-five of these were in Africa. This enthusiastic commitment has perhaps been unfortunate since many donors have been going through a measured withdrawal of support for FSD programmes, just at the time when many national programmes are justifiably accepting its value. Fortunately, a number of donors, including Sweden and the Netherlands, are still continuing to support FSD work in a number of countries.

In any case, the FSD approach continues to live on and flourish not only within national programmes. The current interests of donors in supporting non-governmental organisations (NGOs) and activities in the sustainability area contain heavy doses of FSD principles. In addition, there is a global professional association devoted to FSD, complemented by active regional associations in Asia, Africa, Europe, and North and Latin America.

AN APPROACH FOR THE DEVELOPMENT OF SMALL-SCALE AGRICULTURE

Major Components of Agricultural Development

One of the primary objectives of agricultural development is improving the welfare of farm households through increasing the overall productivity and sustainability of the farming system while taking into consideration the welfare of both individuals and society as a whole. This is done by understanding the factors determining the constraints and potentials of an existing farming system. Two complementary strategies must be adopted to achieve this:

- The development of **relevant improved technologies** by research -- with inputs and feedback from extension and farmers -- and their dissemination via extension.
- The development of **relevant policies and support systems** by planning, and their implementation by extension and governmental and non-governmental developmental organisations.

A lack of compatibility between technologies and policy/support systems has often been a major factor inhibiting agricultural development in the past. Policy/support systems play critically important roles in the successful implementation of strategies directed not only at improving the productivity of small-scale farmers but also in ensuring sustainability of small-scale agriculture.

Table 1: Roles and Functions of the "Actors" in Agricultural Development

Role	Functions	Actors
Implementing		Farmers
Supporting	Transmitters, Input Provision, and Market for Products	Extension Staff, Development Agencies, Non-Profit, Non-Government Agencies, Commercial Firms
Providing Potential Means	Technology Policy/ Support Systems	Research Planning

However, for the agricultural development process to proceed smoothly and satisfactorily there have to be effective interactive links between a number of "actors". These are listed in Table 1. Too often poor or defective interaction between these "actors" inhibits the agricultural development process.

Basic Characteristics of the FSD Approach

Three unique characteristics of FSD are as follows:

- **The farmer plays a central role in FSD**. As we have already stressed, small-scale farmers are rational in the methods they

use and are natural experimenters. As a result, they exploit their understanding of their production environment in operating farming systems that are often very complex and diversified. Thus, the most fundamental principle of FSD is that farmers can, and should be involved in the research and development process. In doing so they become part owners of it because they:

- Can productively contribute to the design and development of appropriate solutions to their problems.
- Have a right to be involved because they can decide whether or not to adopt a particular solution and also stand to gain or lose most from the adoption process.

Therefore, giving farmers a "voice", permits them to help in identifying the appropriate path to agricultural development.

- **FSD employs an interdisciplinary approach**. Because of the complex nature of many of the farming systems, changes in one area can have a positive or negative effect on another area of the farming system. For example, in some instances it is not desirable to try and increase crop productivity without taking livestock into consideration. Also, achieving a successful solution to a technical problem will depend on whether the farming family has the labour and money to adopt it (i.e., an economic issue). Also, sociological reasons which might hinder adoption must be considered. Therefore, in order to address such a wide range of issues, farming systems teams generally consist of representatives of a number of disciplines -- usually agronomists, animal scientists, agricultural

economists, and sometimes sociologists. As a result, an interdisciplinary approach (i.e., a number of disciplines working together on the same problem) has to be used to address farmers' needs.

- **FSD facilitates linkages between the "actors" in the agricultural development process**. In recent years, FSD has increasingly been perceived as a means of facilitating interactive links not only between farmers and station-based (i.e., usually commodity oriented) researchers but also between all the "actors" who play significant roles in the agricultural development process (Table 1). In general, more information has gone to the farmers than has been collected from them. FSD, because of its client (i.e., farmer) orientation, strengthens the importance of information provided by the farmer. Because it facilitates a process rather than producing a product, it must also establish such connections with all the different "actors" . The "products" produced by these other "actors" are the very lifeblood of FSD. Reductionist station-based commodity research has often been a very efficient way of developing technologies that can be used in solving problems identified by farmers, or can be used in exploiting the flexibility that exists in their farming systems. On the other hand, a system perspective is not only needed in designing and evaluating suitable technologies but is also needed in designing effective policy/support systems that can improve both productivity and sustainability. Although the linkage between the farmer and the policy/support system is generally the one most poorly developed, considerable challenges also exist in modifying the conventional top-down orientation characteristic of extension services in many national programmes. In

general this approach has not been able to effectively deal with problems of farmers operating under widely diverse circumstances. In such situations solutions tend to be both location and time specific requiring an interactive mode of operation, a fundamental principle of FSD.

The Principles of FSD

The FSD approach has been developed by the Farm Management and Production Economics Service of FAO, more popularly known as farming systems research and extension. It is based on the development principles of improving productivity, increasing profitability, ensuring sustainability, and guaranteeing an equitable distribution of the results of production.

The farm-household is the principal system and focus of FSD and consists of three basic sub-systems, which are closely interlinked and interactive: the household, the farm, and off-farm activities. The two major categories of activities of FSD, both of which involve intensive interaction with farmers, are:

- **Farming systems analysis**. This involves studying, together with the farmers, the natural and socio-economic environments in which farm-households operate. The aim is to identify the constraints limiting farm productivity and production and hindering improvement in the welfare of the farm-households themselves. Potential solutions to these problems are identified and the results of this analysis, formulated as recommendations for further action, are then passed on to the relevant "actors". These could include researchers, extension and support service

staff, and/or policy makers.

- **Farming systems planning, monitoring, and evaluation**. This involves testing, monitoring, and evaluating improvements on-farm, with the direct involvement of farmers. Examples of such activities include those regarding proposed technological improvements, proposed revisions in farm plans, and improvements in support services and farm-level impact of proposed policy changes. Those improvements thought to be potentially useful are then disseminated to other farmers via the extension service. Prior to this stage, it may be necessary to negotiate adjustments in the policy/support services that will facilitate the dissemination and adoption of the improvements. After dissemination, it is of primary importance to monitor and evaluate the adoption rate of the proposed improvements by the farming community. This provides an indication of the actual value of the improvement being disseminated.

Therefore, there are a number of steps required in implementing FSD. These stages, described in somewhat more detail in Box 3, involve description/diagnosis, design, testing/implementation, and dissemination/impact. In summary, the basic philosophy underlying FSD is composed of the following:

- Farmer participation is indispensable if proposed changes are to be responsive to farmers' priorities and objectives.
- There is often a high degree of specificity (e.g., location, time, resources, and farmers) involved in determining what proposed changes are likely to be relevant.

Box 3 a: Stages of FSD

Description/Diagnosis

- After deciding on the location of the work, start-up activities include reviewing secondary sources of information, making the necessary contacts, assembling the professional team, and making logistical arrangements.
- Farming families are tentatively classified into homogeneous groups. The farming families within each group or domain usually practice the same farming systems, face the same constraints, and have the same potential solution(s) to their problems. This tentative classification can be modified as a result of additional information.
- An informal exploratory diagnosis using rapid rural appraisal (RRA) and participatory rural appraisal (PRA) techniques, *is* undertaken to obtain a qualitative understanding of the determinants of the existing farming systems (i.e., both biophysical and socioeconomic). At the same time, efforts are made with farmers to ascertain the constraints, flexibility, and potential opportunities in the farming systems they are currently using.
- Sometimes a verification survey involving a structured formal survey, suitable for statistical analysis, is undertaken to quantitatively confirm insights obtained in the exploratory diagnosis. It can also be used to provide a database for farm and development planning, policy analysis, monitoring, and evaluation.

Design

- Together with the farmers, the constraints are: ranked according to their severity, and potential solutions are identified after determining what flexibility exists in the farming systems currently practiced.
- An evaluation is made of the proposed solutions before putting them into practice. This can be technological or institutional in nature. A number of analytical techniques can be used to evaluate the potential technical feasibility, economic viability, social acceptability, and ecological sustainability of the proposed solutions before they are put into practice. One or more of the proposed solutions are selected for actual evaluation on-farm.

Box 3 b: Stages in FSD, cont'd

Testing/Implementation

- On-farm testing or evaluation with farmers determines how well the potential improvements fit into the system, whether or not they are accepted by farming households, and what modifications are needed to make them acceptable. As indicated earlier there are three types of on-farm evaluation: of proposed technologies, of proposed farm plans, and of proposed changes in support systems and/or policies. These evaluations are undertaken with a small number of farming households, representative of the recommendation domains whose needs are being addressed.
- Positive results of such evaluation provide justification for the FSD to advocate further action. The tested technologies can be disseminated through the extension service to other farming households in the same recommendation domains. The same applies to the farm plans that have been successfully tested. Favourable test results for proposed changes in support services and/or policies provide valuable farm-level information on necessary programme or policy adjustments (e.g., in extension, marketing of inputs and products, pricing policy, credit, etc).

Dissemination/Impact

By monitoring and evaluating the rate of adoption of the changes which have been proposed, implemented and tested earlier, it is possible to choose the direction for further activity by both researchers and planners.

- Assessing this relevancy requires a farmer-participatory systems approach since small-scale agriculture is the product of a complex and dynamic interaction of numerous components both within and outside the farm.
- Given the complexity of this interaction, on-farm testing and, if necessary, adaptation of proposed changes in consultation with the farmers, will enhance the likelihood of the successful adoption of proposed changes.
- Monitoring rates of adoption and the impact of changes resulting from dissemination activities can help to justify not only future funding for agricultural development activities but also help provide ideas on future research priorities and, if necessary, indications on adjustments that are necessary to facilitate greater adoption and/or a more favourable impact.

The Limited Impact of FSD to Date

Although the evolution and implementation of the FSD approach has brought about some desirable changes, there have been a number of factors that have limited its success. Among these factors are the following:

- The FSD approach is still very young. Since the methodology is still evolving, universally accepted "standard texts" on the "nuts and bolts" of how to do it are still emerging. Another issue related to methodology is that time- and cost- (i.e., money and people) efficient methods for undertaking FSD still need further development. This is important because of the

limited resources available for undertaking research, both on-station and on-farm. Also, although we have stressed the significance that the FSD approach attaches to the positive and interactive contribution of farmers, this aim has often not been pursued sufficiently. RRA and PRA techniques that have evolved rapidly in recent years provide a time- and cost-efficient means for improving farmer involvement.

- Results from the application of the FSD approach are very dependent on the contributions of the other "actors" in the agricultural development process. They provide the lifeblood for the successful implementation of FSD and thus the effectiveness of the interactive linkage function mentioned earlier is critically important in determining the success of FSD. Station-based commodity research is important in providing potential technological solutions to problems identified together with farmers, as a result of applying the FSD approach. If such potential solutions are not available, the short-term impact of FSD will correspondingly be reduced. There was a tendency , particularly when FSD was evolving, to think that FSD could contribute only to the development of improved technologies. This view has been strengthened in part by FSD activities usually being concentrated in technical research institutes. Much less attention in FSD work has been paid to policy/support issues which were assumed to be parameters or constants (i.e., not subject to manipulation). Thus, a "submissive" rather than an "interventionist" approach to policy/support issues emerged which has obviously reduced the potential multiplier effect of FSD-type work. Consequently, although there has been increasing realisation of the importance of FSD's dependence on linkages with other

"actors" in the agricultural development process, and the role it can play in nurturing those linkages, the fact is that this has often not been given the priority it deserved.

- This lack of attention to linkages, in addition to the fact that until recently many FSD initiatives were enthusiastically supported by donors, led to the impression on the part of station-based research, planning and extension agencies that FSD activities were independent. This in turn led, in the case of many FSD-teams themselves, to the notion that their primary responsibility in terms of accountability for their actions was to the donors and not to the national agencies in the countries in which they were located.

- Donors have, on occasion, unknowingly contributed to the lack of success of FSD. However, perhaps because of the realities donors face with respect to their home constituencies, donor support has also created other problems which can be summarized as follows:

    - For a period donors concentrated too much on FSD activities. A negative example was the way research thrusts swung between commodity research and FSD, instead of both being viewed as part of a holistic approach. Even where both station-based commodity research and FSD were present, insufficient attention was devoted to deciding on an appropriate sustainable balance between the two. Instead, the strategy has often tended to be one of "selling" the FSD approach to national programmes. Also, this "selling" has tended to be evaluated in terms of adoption of technologies by farmers -- an ambitious task given the number of

factors outside the control of the FSD teams themselves. Not surprisingly, criticism has been voiced that many of the FSD teams have been too large, too expensive for long-run sustainability, and dominated to an excessive degree by expatriates who, on arrival, had little experience with FSD.

- Donors often have made too short a time commitment to supporting FSD activities. For a number of reasons, the same total quantity of donor resources spread over twice the period of time would probably have had a much greater impact on FSD. For example, as mentioned earlier, methodologies for undertaking cost-effective FSD are continuing to evolve. Thus, earlier efforts in FSD are not likely to have been as effective as later efforts. Also, given the limited resources within national programmes, it is likely that more resources could be obtained for FSD through building up accountability and credibility over a longer period of time. This could be achieved through convincing and established levels of performance, rather than through the quick results and the more confrontationist approach implied by short-term commitments. Although donor assistance has helped in training many individuals in the techniques of FSD, its emphasis on results -- which may have advanced the case for institutionalizing the approach -- has not been very helpful in making rational decisions on the appropriate form of institutionalization.

A More Participatory Mode to Donor Support

It is important to give donors considerable credit for the support they have given to FSD over the years. Donors have played very significant roles in:

- Supporting the development of methodologies for undertaking FSD.
- Helping create a pool of individuals with knowledge of FSD techniques through formal training and/or on-the-job experience.
- Ensuring the current presence of FSD activities in many national programmes.

In fact, donors have played a very important role in popularising the FSD approach. Our current concerns about FSD are fuelled by the uncertainty of its sustainability in some countries without continuing donor support, given the declining resources available to many national agencies.

The time has now come for a more "participatory" approach on the part of donors. In this approach, nationals buy into supervising and assuming the responsibility for the implementation of such projects. The patron/client model of providing donor aid (viewed by some as paternalistic) is now considered anachronistic. Given the increasing levels of trained personnel and nationally-decided developmental initiatives, a more collegiate or partnership mode for planning and disseminating aid is called for. This is an approach a number of donors have been practising for some time and it has recently also

been embraced by the World Bank.

Three particularly important advantages of such a participatory approach are:

- The emergence of a partnership relationship between the donor and national leaders means that the latter are likely to develop a greater sense of ownership in designing the programme, implementing it, and in assuming responsibility for the results achieved.
- Because of the "hands-on" decision-making responsibility of national leaders at all stages of such donor funded projects, the chances of success are improved in the following ways:
    - There is a greater likelihood that donor funds will be used in a way which is compatible with national priorities.
    - There is the increased opportunity that donor resources (i.e., funds and personnel) be used in ways that complement rather than substitute those that can be provided nationally.
    - Because of the likely improvement in the allocation of donor funds, the multiplier effect resulting from the use of such funds is likely to be incremented.
    - At the same time, national accountability in the use of donor funds is increased and the chances of long-run sustainability of initiatives supported with donor funds

is enhanced.

- On a less tangible level, but perhaps equally important in the long run, individual professional growth is stimulated through interaction with others. Participation in the interactive ways we have just outlined provides an admirable "milieu" in which ail participants -- national leaders as well as donor representatives -- can learn from experience and use their increased expertise advantageously in future activities.

An Example of a "Participatory" FSD Project

Sweden and FAO initiated their collaborative efforts in 1960 with a training programme designed to improve food crop production of limited resource farms through the adoption of low-cost food crops technology. Nearly 30 years later, in November 1989, a farming systems programme (FSP) was initiated, sponsored by SIDA (i.e., Swedish International Development Agency) in collaboration with FAO, the Swedish University of Agricultural Sciences (SUAS), Botswana, Kenya, Tanzania, and Zambia. The programme itself is being implemented by the Operational Division of FAO's Agricultural Department in close liaison with the technical service responsible for farming systems (i.e., the Farm Management and Production Economics Service or AGSP). However, implementation of the FSP is directed by a Coordinating Committee (CC). Entrusting control of the FSP to a CC is an unusual set-up in comparison to other projects executed by FAO. We believe this creates special opportunities and challenges. The second phase of the FSP was started recently.

There are at least five elements of the Eastern and Southern African FSP which we think could usefully be considered in other donor-funded projects, and are consistent with the advantages just mentioned. These are as follows:

- There are major synergistic advantages to having a regionally based programme when considerable expertise already exists in national programmes in the region. This is the case with respect to the application of the FSD approach. All the participating countries (i. e., Botswana, Kenya, Tanzania and Zambia) have been implementing the FSD approach to some degree since the mid to late 1970's. In terms of formal institutionalization of the approach, Zambia has led the way, followed by Tanzania and, more recently, by Botswana. Revitalization of the approach has recently taken place in Kenya and a decision has now also been made to institutionalize it in that country. Thus the FSP is playing a very important catalytic and supportive role in encouraging continuation of the FSD approach in countries that have already made significant commitments in that direction.
- Both the donor, Sweden, and the executing agency, FAO, have shown considerable flexibility in the disbursement and use of funds -- an essential ingredient of any project that is controlled by a CC. We particularly approve of the commitment that has been made to provide sustained support for the FSP over a number of years rather than massive inputs for a few years.
- The flexibility of both the donor and the executing agency is further exemplified in the membership of the CC. The CC consists of two representatives from each participating country

(nominated by the governments of those countries) and one representative each from FAO and Sweden (i.e., SIDA and/or SUAS). The senior staff of the Coordinating Unit (CU) also attend the meetings of the CC, which are held twice a year. The position of Chairperson of the CC is rotated annually among the participating countries, as is the venue of the meetings. Voting rights are confined to one each for the four participating countries, with the Chairperson having the casting vote. As the CC exercises considerable control, it hence assumes major responsibility for the implementation of the FSP. CC members from the participating countries consist of FSD leaders in their national programmes and/or senior officers in agencies which interact with, and benefit from, FSD activities. CC members receive expenses for attending CC meetings, but salaries continue to be paid by their home institutions.

- Any regional project requires coordination. However, in the design of the FSP, very deliberate efforts were made to keep the CU small, and to ensure that its operational procedures and activities would facilitate and be supportive of the decisions made by the CC. This has actually been the experience in practice. It is in fact planned that in the fairly near future the senior staff in the CU will be reduced from two to one with the current Swedish Coordinator being replaced by a national of one of the participating countries. Also, throughout the FSP, strenuous efforts have been made to build up support in a number of locations in the participating countries through purchases of equipment (e.g., photocopiers, fax machines, computers, etc.) and provision of FSD related documents. This decentralisation is an important ingredient in trying to

prevent too much concentration of control and resources at the centre, and in trying to ensure long run sustainability of the FSD effort.

- A ZOPP or logical framework planning exercise was undertaken at the beginning of 1993 to ensure that there was a well thought out plan for the second phase of FSP that really expressed the collective opinions of the CC members. During the exercise, detailed objectives and associated activities as well as anticipated outputs and impact indicators were agreed upon. We think this type of exercise is extremely valuable in creating a sense of direction and purpose, and providing a logical and systematic way of making difficult trade-off decisions in using limited resources for different purposes. This approach,' once again, implies the need for great flexibility on the part of the donor, who instead of having a large number of preconceived ideas of what should be done, accepts the idea of a "roll over design approach", subject to periodic modification in the light of experiences and results achieved earlier in the project. Such periodic adjustments, providing they are not too contradictory and follow a generally consistent pattern, should improve the return from, and multiplier effect of, limited donor resources.

- The FSP is supporting activities relating to training, networking and research and development on a regional basis in order to further the acceptance, institutionalisation and sustainability of the FSD approach in the participating countries. Whenever possible, regional cooperation, complementarity and collaboration is emphasised in the activities funded. In addition, in view of the need to ensuring the sustainability of the efforts in the long run, the FSP actively seeks to build on

institutions and activities already operating in the region rather than setting up alternative systems that may not answer this need. Consequently, for example, support is being provided for FSD related networks which already exist in the region, and the development of FSD teaching materials that can be used in well-established local agricultural institutions. Some of these activities of course indirectly support the development and acceptance of the FSD approach in countries other than those directly involved in the FSP. We see this as a desirable long-run spin-off in facilitating the general acceptance of the FSD approach in the whole of Eastern and Southern Africa.

Major Challenges Facing FSD

There appear to us to be four major challenges that FSD practitioners need to address if the approach is to have a bigger impact in the future. These are the following:

- **Continue to improve the efficiency of the FSD process**. To do this there needs to be continued emphasis on short-cuts to implement the approach and improve the returns from such activities. Possible ways of doing this include:
    - Greater reliance on farmer participatory techniques and moving as quickly as possible through the stages of FSD so as to get results that can be disseminated.
    - Increasing the multiplier effect of results as much as possible, by collecting "site" (i.e., physical and socioeconomic) descriptors to improve possible

extrapolation to other areas. These include targeting (i.e., determining under what physical and socioeconomic circumstances the results apply) and conditional information (i.e., what should be done if there are variations in the actions required to achieve the best results).

- Given the heterogeneity in the farming community, developing solutions to problems that are "better" rather than "best" may be a more time and cost efficient way of using limited research and developmental resources.

- **Continue nurturing interactive linkages**. In most current FSD activities interactive linkages with all the "actors" in the agricultural development process could be improved. The linkages to those responsible for designing and implementing the policy/support system demand particular attention. As a result of such nurturing, the degree of accountability with reference to FSD activities should be increased, improving its potential for achieving a higher degree of complementarity with other agricultural development "actors".

- **Greater emphasis on adoption/impact assessment studies**. Such studies, of course, are the best measure of the impact of the agricultural development process. Thus, the credit for favourable results from such studies cannot be allocated only to FSD activities. However, FSD teams, because of their on-farm location and pivotal linkages with other partners involved in the agricultural development process, are often in the best position to take a leadership role in their execution. Such studies are increasingly required to justify future funding of

activities undertaken by the various "actors" in the agricultural development process, but, as suggested earlier, they can and should be used, for other purposes as well. These involve feeding back priorities for further research and for providing evidence to argue for necessary adjustments in the policy/support system to encourage greater adoption of these adjustments. In doing so such initiatives can help improve the return from future resources allocated to the agricultural development process.

- **Incorporate concerns for sustainability in the FSD process**. FSD tries to help the farmer with the problems he or she has identified. Of course, the reason for this is the aim of providing assistance in which they have an interest. It is likely that these "felt" problems of farmers will have a short-run production focus (particularly when the farmer is operating very close to the survival level). Also, it is possible that while FSD is helping to solve the problems of an individual farmer, other problems may be created for society as a whole. Thus, helping one individual household may harm other households in the community. Another example would be the effect of a proposed technology on maintaining the long-run productivity of the land. When designing technology to help farmers increase their productivity, consideration must be given to possible long-term effects (e.g., decreasing the amount of productive land available) of that intervention. Therefore, if FSD workers are not careful, their work can result in creating two types of inequalities: helping some farming households -- or even certain individuals within those households -- at the expense of others, and/or reducing the quantity and quality of land that can be productively farmed by future generations.

Avoiding the creation of such inequities constitutes a major challenge to FSD personnel who need techniques to screen out proposed technologies and policy/support systems that might cause them. The challenge in FSD is to implement currently evolving methodologies that can help in simultaneously addressing the productivity and sustainability issues, considered in both ecological and livelihood terms.

Examples of FSD Helping Fanners

The application of the FSD approach has tended to have most immediate success -- assessed in terms of farmer adoption -- in situations where station-based research has already developed a number of potentially useful technologies that can solve problems articulated by farmers. It has also tended to be more successful in areas blessed by reasonably favourable climatic conditions and good soils. In such areas it is often possible to identify solutions to problems by exploiting flexibility in the farming system (e.g., planting later to avoid a particular disease or insect problem) rather than attempting to break the constraint head-on. Directly breaking the constraint often requires bigger changes on the part of farming-households and so reduces the chances of the solution being adopted.

Three specific examples of the FSD approach producing useful results are taken from countries mentioned earlier, where FSP operates:

- **Zambia -- example of dambo utilization**. When FSD type work started in the Luapula province of Zambia in 1982, informal and formal diagnostic surveys were undertaken throughout the province. As the programme progressed,

additional detailed surveys were conducted, further increasing available information. Some of the major constraints identified and verified in one of the target areas were as follows:

- Crop production was seasonal, dependent on the rainfall pattern which was limited to six months of the year.
- Labour demand was at its peak during crop cultivation and harvesting, and at its lowest during the later part of the dry season.
- The supply/availability of green fresh vegetables, which form a major part of household diets, was at its lowest levels during the later part of the dry season.
- Production of green vegetables and other supplementary crops during the dry season required either the development of expensive irrigation systems or the utilization of low lying areas (**dambos**), where there was residual moisture for the whole of the dry season.
- There were no "ready-made" technologies for crop production under residual moisture conditions in that area.

The analysis of this information by the FSD team revealed that there was sufficient labour available during the dry season which could be utilized for the production of vegetables on **dambos** during that period. However, this would only be possible if production technologies were available.

This led in 1984 to the formation of a **dambo** utilization programme whose main objective was to increase the supply and availability of fresh vegetables, providing food diversity for households during the dry season. This was to be done through the development of crop production technologies for the **dambos** and the dissemination of knowledge to both extension workers and farmers who at the same time participated in the developmental activities. In the area where this programme started, the results to date have been as follows:

- There has been a marked increase in vegetable production in the **dambos** which were once unproductive. This has resulted in increased food diversity and cash income for the families throughout the year.
- The demand for similar work in other localities within the province has increased and outstripped the capacity of the FSD team in the province. Increased use of extension workers in areas where FSD staff are not available, is being considered.
- The need for a new research focus has emerged. The FSD team has started work in determining and monitoring the long term ecological and environmental effects of intensive utilization of the **dambos.** The need for this has arisen from the increased demand and utilization of the **dambos** by the local farmers.

- **Botswana -- example of double ploughing**. In the harsh

semi-arid climate of Botswana, the major constraint mentioned by farmers is generally one of insufficient soil moisture to ensure satisfactory crop growth. Rainfull varies considerably from year to year, and within a given year itself. Average annual precipitation is in the range of 450-500mm, all of which falls within the summer months. There is no month in which rainfall exceeds potential evapotranspiration with any degree of reliability. There are on average about 15 planting days per year scattered over a four month period, with plant germination tending to decrease rapidly in planting undertaken more than three days after a planting rain. Farmers recognise this in their traditional systems, in broadcasting seed (mainly sorghum, millet, cowpeas and water melon), and ploughing it in for two to three days after each planting rain. This land extensive system, which is a natural rational response to the limited availability of draught animals or machinery (usually donkeys or oxen but sometimes tractors) and labour during the ploughing bottleneck period, is also a risk-averse strategy in the sense that planting is spread over a long period. The timing of operations during the ploughing-planting bottleneck period is important in order to make best use of available water and to improve the degree of stand establishment -- a critical determinant of crop yield.

Thus, much of the research work in Botswana, both on the expriment station and on farm, has concentrated on tillage systems to improve both water availability and efficient water usage. One strategy that has been examined a great deal, with the active participation of farmers, is that of a pre-planting ploughing operation -- carried out at least one rain before planting -- to open up the soil profile in order to trap more

water. Results from this work have now led to an official recommendation.

It is not possible to go into a detailed discussion here of how the application of the FSD approach helped to improve the understanding as to when early ploughing might or might not be a recommended strategy. However, put briefly, it did help to highlight the following points:

- Early ploughing should be encouraged when farmers have control over draught power, when they are faced with a land constraint or lack labour for weeding, and in situations where soils are relatively deep and have a good water holding capacity.

- Recognition of the considerable variations in rainfall during the growing season means that farmers base their decisions on how the year unfolds. Consequently, this highlights the need for a series of options rather than the conventional universal or "blanket" recommendations. At the same time the options they are able to select will be dependent on the resources they have at their disposal. Sensitivity to these issues, as a result of FSD activities, led to guidelines indicating, for example, that:

    -- The traditional plough/planting operation option may be the best under certain circumstances.

    -- Early ploughing should only be done when it is not possible to plant, so that planting

opportunities using the traditional system are not sacrificed. This could be done, for example, through continuing to plough but not planting more than three days after a planting rain.

-- Depending on resources available to the farmer, there are a number of possible variations available in the second tillage (i.e., second ploughing, harrowing or cultivating) and planting (i.e., broadcast or row) operations for the early ploughing system.

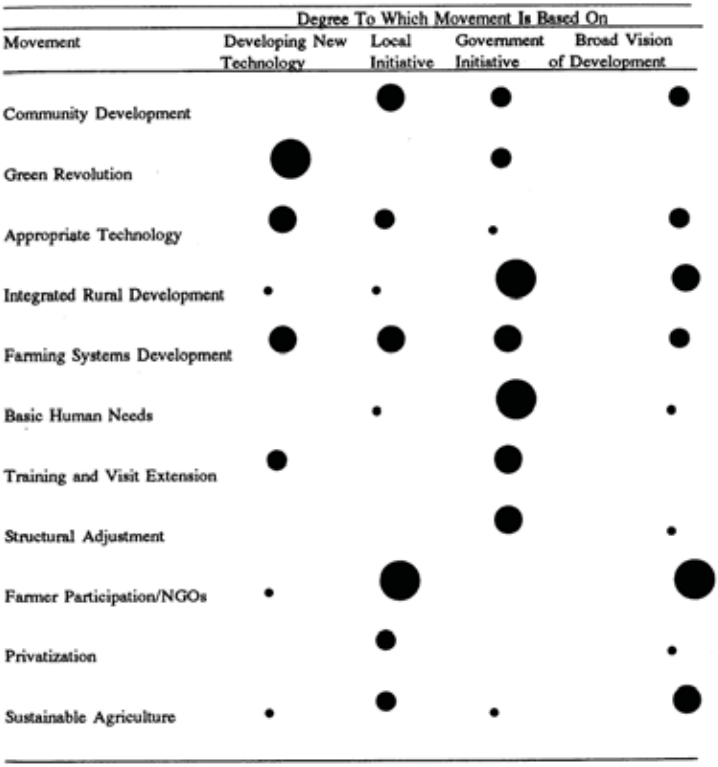
The use of the FSD approach helped sensitise the whole research process by including the farmers' perspective and taking account of the socioeconomic dimension. It also helps to make the guidelines appropriate for more farmers through widening intervention possibilities and by including targeting and information on conditions. Also, it helped identify one snag to the widespread adoption of the early ploughing operation. During drought periods the Government of Botswana has heavily subsidised the ploughing operation. Unless it also subsidises the secondary tillage operation, farmers are likely to continue their extensive farming systems in order to benefit from the subsidy. This provides an example of a lack of coordination between technology and the policy/support system, an issue we mentioned earlier.

FINAL COMMENT

FSD has a "client" (i.e. farmer) orientation and has a balanced view of four essential ingredients required to stimulate and sustain the agricultural development process, including small-scale agriculture. These are shown in Figure 1, developed by Tripp [1992], and are: the need for improved and relevant technologies, the use of local initiative, the requirement of some governmental involvement, and a broad vision of development. The figure lists in rough chrono-logical order the different initiatives supported by the donor community over the last 30 years in efforts to speed up the rural development process, including small-scale agriculture. In general there has been a marked lack of success. Unfortunately, as Tripp has noted: "the tragedy is not that these movements fail to achieve every-thing they set out to achieve, but that too few of the lessons they produce are articulated or used." We are confident however that, unlike some other approaches, the basic tenets underlying FSD are here to stay.

There is no quick fix to accelerating the process of agricultural development. We are convinced that a balanced approach in terms of initiatives is required, if agricultural development, and the development of small-scale agriculture is to proceed at a satisfactory rate. As Figure 1 indicates, this balance is better achieved by FSD than it is by some of the other approaches. We also expect that success in pursuing some of the other initiatives will be determined in part by the use of methodologies developed in applying the FSD approach. Obvious examples are the farmer participatory techniques associated with FSD, which can facilitate the work of non-governmental organisations (NGOs) and which will undoubtedly be very important in addressing sustainability issues, particularly those relating to the development of small-scale agriculture.

Figure 1: Characteristics of Rural Development Movements[a]



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