

Enabling Long-Term impact of Soil Conservation Through Farmer-Driven Extension

*By Roland Bunch**

LONG-TERM SOIL CONSERVATION IMPACT

Soil conservation (SC) programs have not always earned a positive record in terms of long-term impact. Although the failure of programs to achieve long-term impact can be attributed to many different factors, one major problem stems from the common assumption that SC measures are inevitably too expensive, and the payback too long, for poorer farmers to be interested in, or capable of, incurring the costs of adoption. This assumption leads to either the subsidization of SC technologies or the outright construction of SC structures by the development agency. Each of these processes lead to either money-driven or donor-driven processes, rather than farmer-driven processes.

Many studies have shown that a lack of major farmer investment in technology adoption is frequently positively correlated with a lack of farmer commitment to the technology, and a resulting lack of investment in technology maintenance. But maintenance of the technology is particularly crucial in SC work because virtually all SC technologies are "fragile". That is, they require maintenance if they are to continue to working properly. Without maintenance, they often cause breakthroughs and gullies. Some authors have claimed that where more SC work has been done, increased erosion has been the result. (Pretty and Shah, 1994)

In Central America, a number of agencies have developed SC/soil recuperation technologies that pay for themselves through increased productivity within a cropping cycle, or at least one year. Thus they have been able to develop programs in which farmers adopt, select, and adapt technologies according to the technologies' inherent costs (including those of maintenance) and benefits, rather than according to the technologies' benefits, regardless of its costs and assuming no maintenance. This technological innovation has therefore allowed the programs to become farmer-driven, rather than donor-driven.

The Nature of Sustainability in SC

Experience shows that SC projects can have long-term positive impacts. In Central America, one study provided evidence of major influence from five to fifteen years after

the termination of various programs. Nevertheless, this same study showed that long-term impact does not derive from the specific technologies being taught. As the situation changes for farmers, so technologies must change. As land becomes more scarce, as input and produce prices fluctuate, as new insect and disease pests spread, as new crops are grown and as new technologies are adopted and adapted, the over-all system must constantly adapt, including the amount of labor dedicated to SC and the particular technologies used. (Bunch and López, 1994)

Thus, long-term positive impact cannot, over the long term, be the result of any single technology. Even the vast majority of the most highly successful of SC technologies have a half-life of approximately six years. (Bunch and López, 1994)

Long-term impact must come from another source. In fact, according to the same study, the increased yields experienced as much as five and fifteen years after program termination were due to an ongoing, farmer-managed and -driven process of farmer experimentation and innovation. In an environment of constantly changing economic and technological conditions, such a farmer-driven process provides the only chance that farmers can have to continue improving their productivity and thereby continue to compete over time.

In order to make the process farmer-driven, farmers must be able to fulfill three major roles (and many minor ones) in furthering their own agricultural development:

1. Establish and manage experiments in order to modify those technologies already known and develop new ones,
2. Spread knowledge of useful technologies from one farmer to another, and
3. Carry on, by themselves if necessary, these processes of agricultural investigation and extension, once they have learned them, thereby continuing to increase their yields.

The first two processes are described by Robert Chambers in his writing on the "farmer first" approach, (Chambers, et al., 1989) as well as in Two Ears of Corn. (Bunch 1982) The third activity, that of villagers' sustaining the growth in agricultural productivity wholly or largely by themselves, is a much more complicated issue.

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¹The "soil recuperation" technologies are ones like green manure/cover crops, mulching or conservation tillage, which combine direct SC impacts with other impacts that improve soil quality and water retention, and therefore productivity.

The Factors Necessary for Achieving Sustainability

What, then, are the factors that must exist in a community for the farmers to, at the very least, maintain high levels of productivity? COSECHA (the Association of Advisors for a Sustainable, Ecological and People-Centered Agriculture) personnel have asked this question of groups of agronomists in some three dozen different nations. The resulting list is virtually the same anywhere the question is asked, and almost always includes the following:

1. The **motivation** to continue the development process.
 2. **Self-confidence and a respect for their own knowledge and culture.** People who are convinced they are ignorant or incompetent will, in fact, become incompetent.
 3. **The ability to organize and manage experiments.** New pests attack crops, seeds degenerate, input prices rise, old markets dry up, and new ones appear. The only way farmers can maintain both productivity and profitability in a modern, rapidly changing environment is to constantly experiment with new technologies.
 4. **Medium- to long-term use rights over a certain minimum of natural resources that are in a satisfactory condition.** Without a minimum of certain resources--land, water, etc.--no one can produce enough food to live well.
 5. **Access to or ownership of adequate financial resources.** This need not be very much. Most present loan programs handle much more money than small farmers really need. But farmers do need at least some extra capital to risk in their experimentation and invest in improvements. Most of this will usually result from their own increased productivity.
 6. **A certain basic knowledge of biological and agronomic processes.** This knowledge is necessary in order to understand experimental results and decide what possibilities of improvement will be most promising for future experimentation.
 7. **A diversified agriculture.** Knowledge of a series of crops, animals, and trees provides lower risk and a basis for future innovations.
 8. **The ability and motivation to share information about agricultural technologies with other farmers.** No one farmer can ever do enough experimentation to continue improving his/her productivity. The only way whole villages or areas can solve their problems and move ahead is for each farmer to be learning from the experiments of dozens of other farmers.
 9. **Organization-building capacity.** With constant innovation, new needs and new opportunities will present themselves. These will often best be seized or solved not through some pre-existing structure, but by new organizations, permanent or temporary, that people will create if and when they are needed.
- Catalysts in this process would be:
10. **Contacts with outside sources of information and support.** The proximity of, and easy access to, well-motivated and knowledgeable individuals and organizations that can provide technical information and guidance can be very important in making the farmer-driven development process more efficient.
 11. **Administrative capabilities.** The ability to plan strategically, to handle money and accounting procedures,

and to manage group dynamics can make the process still more efficient.

12. **Minimal rural infrastructure and access to markets.** Good roads, or efficient river or ocean transportation, provide access to the markets whose prices motivate farmers to innovate and help them pay for additional technological experimentation and innovation.

13. **A high rate of literacy among the farmers.** Although the process has worked in areas where functional adult literacy was as low as 25%, higher literacy rates make the process more efficient.

14. **Significant participation of women in the process.** A tremendous amount of recent literature gives evidence of the many ways in which women's participation in the agricultural development process makes it more efficient.

How to Achieve these Factors of Sustainability

This list of factors of sustainability appears to be long and difficult to achieve, but it need not be difficult. In fact, experience shows that most of these factors can be achieved as a by-product of a good, farmer-driven system of agricultural extension. That is, by using just a few, well-chosen principles of agricultural extension, virtually all of the above factors will be reinforced time and time again over the natural course of the program. The achievement of most of these factors will not require any special effort on the part of the program; most of them are reinforced each growing season by the very principles used in designing the program.

These basic principles of agricultural extension include:

1. **Motivate and teach farmers to experiment with new technologies on a small scale.** This experimentation reduces the risk of adoption and provides a means for them to continue to develop, adopt, and adapt new technologies in a permanent scientific process of innovation. This principle is now frequently referred to as "participatory technology development."
2. **Use rapid, recognizable success in these experiments, rather than artificial incentives or subsidies, to motivate farmers to innovate.**
3. **Use technologies that rely primarily on inexpensive, locally-available resources.**
4. **Begin the process with a very limited number of technologies.** The program will thus be focused, and can achieve the maximum possible percentage of successes from the start, allowing even the poorest farmers to become involved in the process.
5. **Train village leaders as extensionists and support them as they teach additional farmers.** This process creates and nurtures a community-based multiplier effect. This principle is now called "farmer-to-farmer extension" in many nations of Asia.

To take the first principle, for example: By experimenting, farmers gain the ability to manage experiments through the time-honored methodology of learning by doing. When farmers experiment, they gain a good deal of basic agricultural knowledge through their experiments. When farmers know how to experiment, and are motivated to do so, they thereby gain the ability to continue to diversify their agriculture. And when they are capable of constantly acquiring information in this manner,

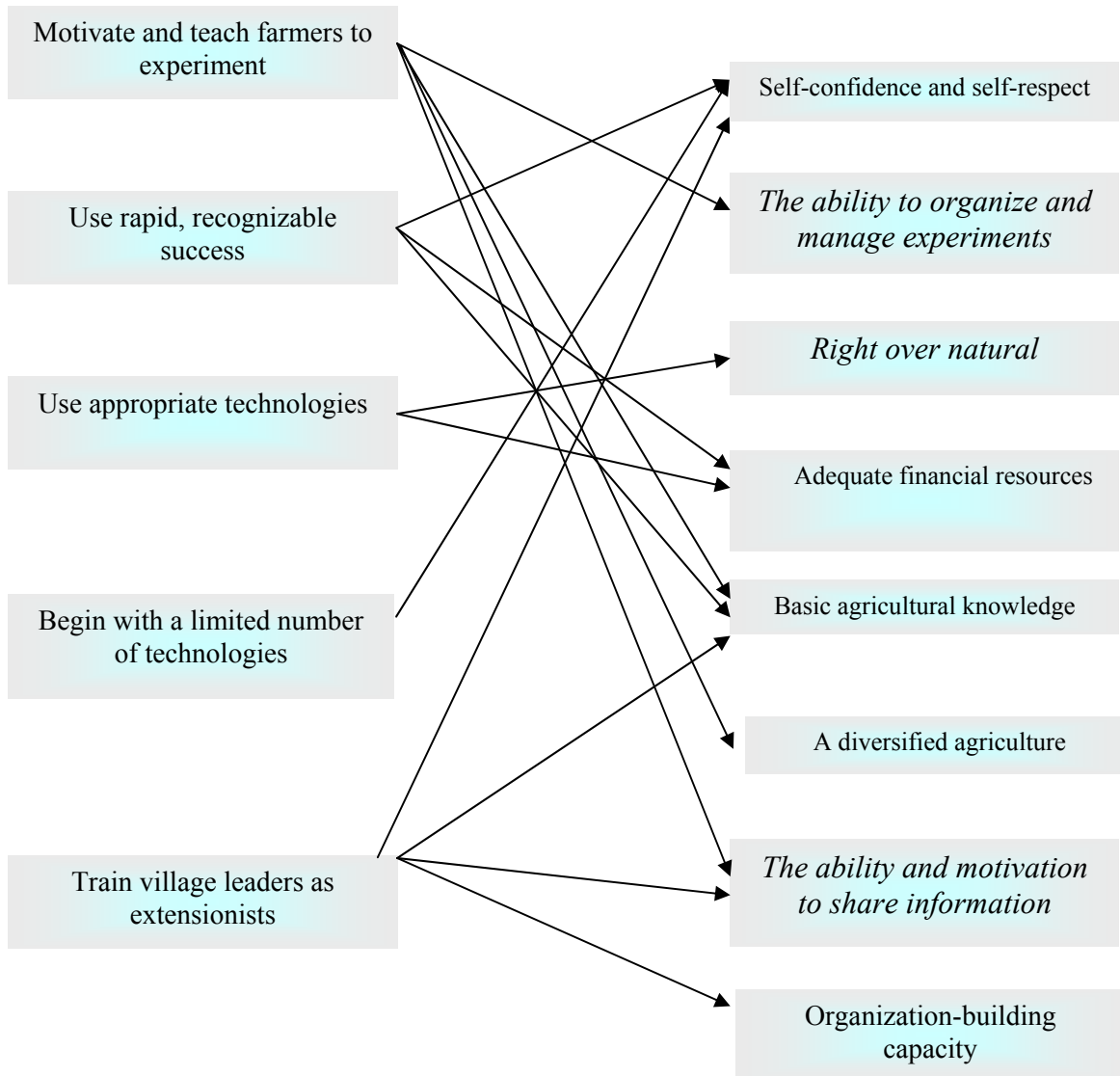


Figure 1 (above) compares a list of these extension principles, as described in the book *Two Ears of Corn*, with the above list of factors of sustainability. Each arrow indicates the existence of a causal relationship between the competent use of the principle and the strengthening of one of the factors needed for sustainability.

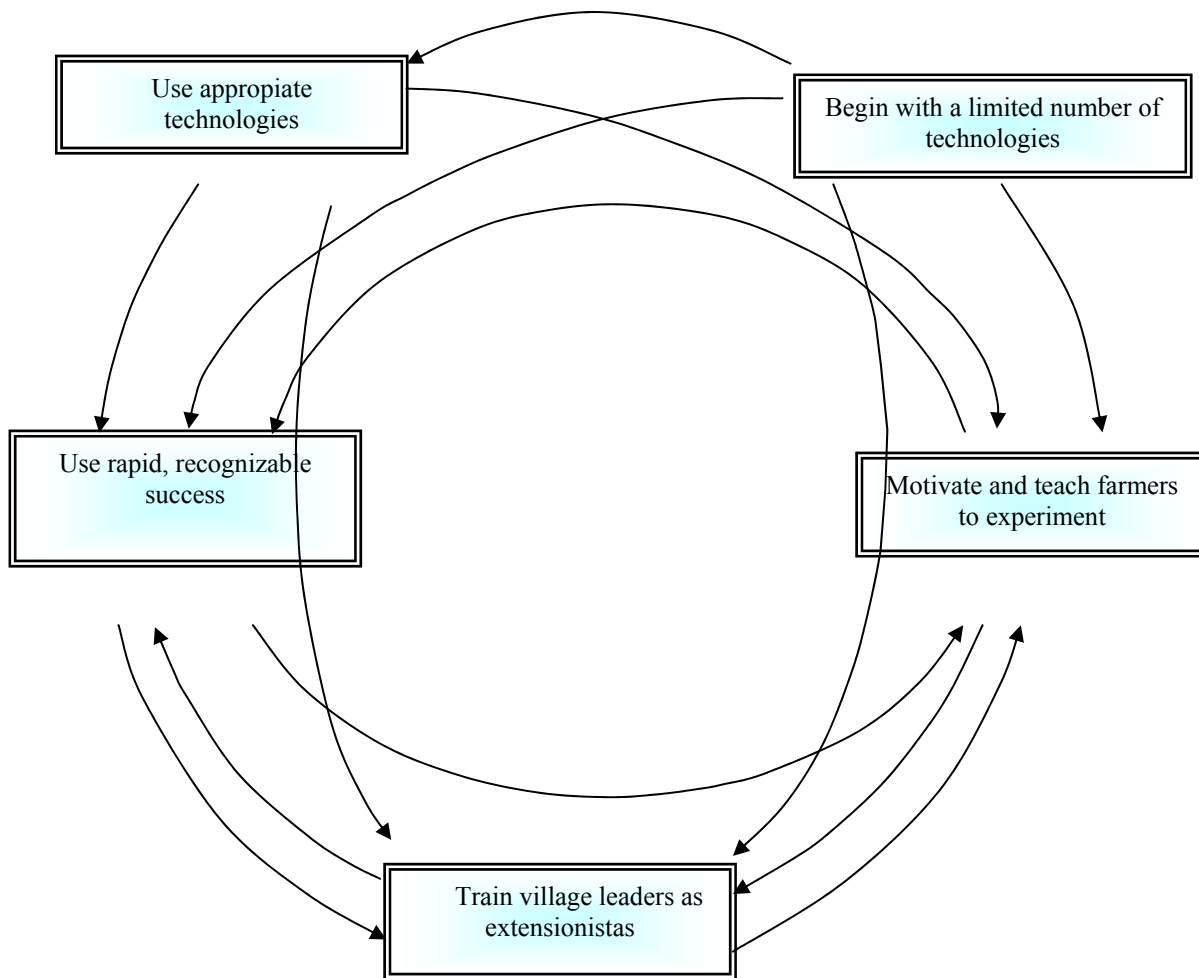
they will, on a sustainable basis, have something valuable to share with each other.

Thus, by using these principles of extension in SC programs, they can strengthen the very abilities and conditions that will allow the farmers to carry on the process by themselves, thereby sustaining and expanding the positive impact of the SC program.

A good number of organizations already use one or more of these principles. Numerous farmer-to-farmer extension programs in Southeast Asia train villagers as extensionists, while a growing movement in South America uses participatory technology development, a name that emphasizes the development of technology by villager farmers through small-scale experimentation.

Nevertheless, long experience in a diversity of cultures has shown that the five principles of extension, when used together, reinforce each other, each one making the others more effective. That is, a synergy exists among the five principles. Training villager extensionists, for instance, becomes much more efficient, and recognizable success much more common, when a program begins with a limited technology. Farmer experimentation becomes virtually impossible, and far too expensive, when the technologies (i.e. variables) are numerous, especially if several of the technologies are quite expensive. Thus, the principles achieve much more impact when they are applied as a group.

In conclusion, the extension principles go a long way



toward strengthening precisely those factors that can make the development process self-sustaining at the village level.

SPECIFIC CASES STUDIED

San Martin Jilotepeque, Guinope, and Cantarranas

The San Martin Jilotepeque Program in Guatemala and the Guinope and Cantarranas Programs in Honduras, all named after the townships in which they were headquartered and all run by World Neighbors, were among the first SC programs anywhere to incorporate all five of the above principles of extension into their programs. The San Martin Program operated from 1972 through 1979. Several of the villager leaders trained in that program then moved to Honduras to staff the Guinope and Cantarranas Programs, which worked from 1981 to 1989 and from 1983 to 1990, respectively.

The technologies in each case varied. In San Martin, the initial technologies taught were contour ditches with Napiergrass (*Pennisetum purpureum*) strips, plus the proper use of a nitrogen side-dressing of urea in maize

(*Zea mays*). Later, the incorporation of crops residues, the use of animal manure, a crop rotation, and a green manure (*Lathyrus nigrivalvis*) were also introduced. In Guinope, drainage ditches and the use of chicken manure were the initial technologies, while through the years several green manure/cover crops were introduced, along with strip farming and in-row tillage (or strip tillage). In Cantarranas, green manure/cover crops and drainage ditches were the initial technologies, and microterraces, in-row tillage, and the growing of vegetables as cash crops were emphasized later on.

Local farmers were able to learn the small number of simple technologies relatively easily, and by the second or third year in each program, were voluntarily teaching classes themselves. By the fourth year, all extensionists in all programs were villager extensionists, the more experienced being paid a small stipend. These leaders, as they gradually moved into higher positions within the programs, took over the decision-making process of each program well before the outside funding ended. And the process carried on.

In San Martin, for instance, maize yields at Program

initiation were 400 kg/ha. At Program termination, they were just less than 2,400 kg/ha, but fifteen years later (1994), they had reached an average of 4,500 kg/ha in four villages studied. In the same fifteen years after the Program had closed down and all outsider personnel left, bean (*Phaseolus vulgaris*) yields (the second staple of the area, after maize) had also climbed by over 75% on average. Yields in Guinope and Cantarranas had not increased nearly as much as in San Martin, but in the four to five years after program termination, yields in some crops had already begun increasing, while the yields in others had at least maintained those achieved at program termination. Obviously, the process of agricultural improvement had been sustained.

The Campesino a Campesino Program, Nicaragua

Another very important case is that of the Campesino a Campesino (farmer to farmer) Program (PCaC) in Nicaragua. PCaC began in the early 1980's when Mexican farmer extensionists from the State of Tlaxcala, who had been trained by two farmer extensionists from San Martin Jilotepeque, began visiting Nicaraguan farmers who were members of the Unión Nacional de Agricultores y Ganaderos (UNAG). Gradually, a program under the UNAG grew into a nation-wide movement that has not only carried SC to farmers in some 40 townships across the country, but has been a very influential example that has resulted in many of the nation's nongovernmental organizations' also having adopted most of the five principles.

PCaC is much more a true villager farmers' movement than the programs in Guatemala and Honduras. PCaC's hundreds of volunteer extensionists were, up until three or four years ago, supported by only a skeleton staff of two or three agronomists in Managua. More recently, the number of agronomists has increased and regional offices have been set up around the country, but the basically villager-run, voluntary nature of the Program has been maintained.

PCaC has been highly successful at spreading agricultural innovations across a much wider area much more rapidly than any other program using the five principles. The cost of the total Program per farmer who adopts at least some of the technology is about equal to that in San Martin (US \$ 50) and about one tenth what it was in Guinope or Cantarranas (US \$ 400 to \$ 500).

Some observers claim this incredibly rapid expansion with apparent far-reaching success has resulted in low percentages of villagers actually innovating within most villages. Other observers feel that this rapid expansion with minimal supervision could only occur in a nation in which major change has occurred and the villagers are fairly well-organized and highly motivated, as was the case in Nicaragua during the 1980's. Whether or not these

perceptions are accurate, there is no argument about the incredible, widespread impact of the Program, achieved on a relatively limited budget.

IMPLEMENTING FARMER-DRIVEN PROGRAMS

Although the concept of farmer-driven extension is fairly simple, the implementation of such programs is often more complex than it would seem at first sight. Nevertheless, as concepts such as participation in development, farmer-to-farmer extension, participatory technology development (ptd) and farmer empowerment spread around the world, more and more agricultural development agencies are trying to establish farmer-driven agricultural programs. How to do so is outside the range of this paper, but a number of good books on the subject are available. (Bunch, 1982; FAO, 1993; Hesse, 1994; Neugebauer, 1995)

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